

**NOTICE !**

**ALL DRAWINGS  
ARE LOCATED  
AT THE END OF  
THE DOCUMENT**

*Study*

000006695

# **EG&G Rocky Flats**

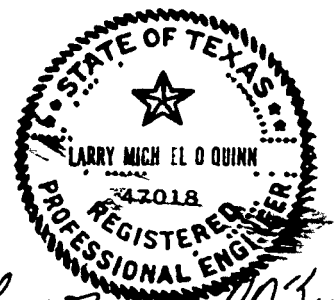
Golden, Colorado

## **Solar Pond/Pondcrete Stabilization Project ( ) Pads No.750 and 904**

### **Phase I - Material Handling Study Deliverable No.412**

<b>FOR REVIEW &amp; COMMENT</b>	
NO COMMENT	<input type="checkbox"/>
SEE COMMENTS	<input type="checkbox"/>
By	_____
Date	_____

September, 1991



**Brown & Root**

AD

LD

000006695

*Larry Michael Quinn*  
Oct. 1, 1991

# **NOTICE:**

The pages in this document do not follow any numbering system therefore, the Administrative Record staff cannot verify the completeness. If a better copy is found, it will be microfilmed to replace this document.

The Administrative Record Staff

**PHASE I**

**MATERIAL HANDLING STUDY  
DELIVERABLE NO. 412**

**FOR**

**ROCKY FLATS SOLAR POND/PONDCRETE  
STABILIZATION PROJECT**

**PADS NO. 750 AND 904**

**DRAFT 3**

**ROCKY FLATS PLANT  
GOLDEN, COLORADO**

**PREPARED BY:**

**BROWN & ROOT, INC.  
1500 CITY WEST BLVD  
HOUSTON, TEXAS 77042**

**SEPTEMBER 28, 1991**



**EG&G ROCKY FLATS SOLAR POND/PONDCRETE  
STABILIZATION PROJECT**

**PHASE I - MATERIAL HANDLING STUDY  
DELIVERABLE NO. 412**

**TABLE OF CONTENTS**

**SECTION NUMBER**

<b>1 0</b>	<b>EXECUTIVE SUMMARY</b>
<b>1 1</b>	<b>Introduction</b>
<b>1 2</b>	<b>Assumptions</b>
<b>1 3</b>	<b>Conclusions</b>
<b>1 4</b>	<b>Recommendations</b>
<b>2 0</b>	<b>HISTORY OF THE MATERIAL HANDLING STUDY</b>
<b>2 1</b>	<b>Introduction</b>
<b>2 2</b>	<b>The Analytical Process</b>
<b>3 0</b>	<b>MATERIAL HANDLING SYSTEM DESCRIPTION</b>
<b>3 1</b>	<b>Introduction</b>
<b>3 2</b>	<b>Function Description</b>
<b>3 3</b>	<b>Material Handling Equipment Design</b>
<b>4 0</b>	<b>INVENTORY AND STORAGE ANALYSIS</b>
<b>4 1</b>	<b>Pond Sludge Processing</b>
<b>4 2</b>	<b>Pondcrete/Saltercrete Processing</b>
<b>5 0</b>	<b>COMPUTER SIMULATION</b>
<b>6 0</b>	<b>BLOCK FLOW DIAGRAMS</b>
<b>7 0</b>	<b>MANNING REQUIREMENTS</b>
<b>8.0</b>	<b>FORK TRUCK REQUIREMENTS</b>

**EG&G ROCKY FLATS SOLAR POND/PONDCRETE  
STABILIZATION PROJECT**

**PHASE I - MATERIAL HANDLING STUDY  
DELIVERABLE NO. 412**

**TABLE OF CONTENTS (Cont'd)**

**SECTION NUMBER**

<b>9.0</b>	<b>MATERIAL HANDLING DESIGN BASIS</b>	<b>--</b>
<b>9.1</b>	<b>Description of Project</b>	
<b>9.2</b>	<b>Inventory of Waste to be Stabilized</b>	
<b>9.3</b>	<b>Input Design Basis Information for Pad 750</b>	
<b>9.4</b>	<b>Input Design Basis Information for Pad 904</b>	
<b>9.5</b>	<b>Common Process Material Design Basis Information</b>	
<b>9.6</b>	<b>Table of Design Weights for Objects to be Handled</b>	
<b>9 7</b>	<b>Fork Trucks</b>	
<b>9.8</b>	<b>Operating Schedule</b>	
<b>9.9</b>	<b>Wind Velocity Operating Restrictions</b>	
<b>9.10</b>	<b>Clearance Requirements for Safety Limitations</b>	
<b>9.11</b>	<b>Storage Limitations</b>	
<b>9.12</b>	<b>Limitations Associated with Transfer of Tri-walls from Pad 750 to Pad 904</b>	
<b>9.13</b>	<b>Table of Design Time Allowances for Various Functions</b>	
<b>9 14</b>	<b>Miscellaneous Design Information</b>	

## APPENDIX

EXHIBIT A	Glossary of Project Terminology	
EXHIBIT B	Rocky Flats Plant Standard "Standard for Flush Panel Plywood Box Assembly" (For Hazardous Material)	SX-211
EXHIBIT C	Rocky Flats Drawing No D-25883-001, Issue H, Sheet 1 of 2 and Rocky Flats Drawing No D- 25883-002, Issue H, Sheet 2 of 2	
EXHIBIT D	Rocky Flats Plant Standard "Standard for PVC Liner for Flush Panel Box"	SX-209
EXHIBIT E	Rocky Flats Plant Standard "Standard for Fiberboard Liner for Metal and Flush Panel Box"	SX-208
EXHIBIT F	Rocky Flats Plant Standard "Standard for Pressure- Sensitive Adhesive Vinyl Plastic Tape"	SX-122
EXHIBIT G	Container Documents	
EXHIBIT H	Rocky Flats Plant Standard "Standard for PVC Liner for Triple Wall Box"	SX-220
EXHIBIT I	Rocky Flats Plant Standard "Standard for Triple Wall Body, Outer Cap, and Insert Cap"	SX-222
EXHIBIT J	Rocky Flats Plant Standard "Standard for Corrugated Metal Waste Container" (Steel Box)	SX-231

**APPENDIX (Cont'd)**

<b>EXHIBIT K</b>	Rocky Flats Drawing No D-26383-2, Issue N, Sheet 2 of 4, "Corrugated Metal Waste Container - Assembly No 2"
<b>EXHIBIT L</b>	Data Sheets for Clark ECS Series Cushion Tire Lift Trucks
<b>EXHIBIT M</b>	Data Sheets for Clark TM Series Electric Tri-Wheel, Multi-tire Lift Truck
<b>EXHIBIT N</b>	American Conference of Governmental Industrial Hygienists Drawing No VS-303 "Barrel Filling"
<b>EXHIBIT O</b>	Design Basis Memo - Pond Sludge, Table 2- Estimated Quantities from Weston Report Data, dated 23-Aug-91
<b>EXHIBIT P</b>	Design Basis Memo - Pond Sludge, Table 1 Relationships Between Process Inputs and Pondcrete Output, 3 1 Maximum Aggregate/Cement Ratio
<b>EXHIBIT Q</b>	Brown & Root Interoffice Memorandum, dated August 27, 1991, Reference Stack Height Analysis for Half Crates of Stabilized Waste
<b>EXHIBIT R</b>	Brown & Root Time Study for Stripping a Triwall

Introduction

This "Material Handling Study" has been prepared for EG&G Rocky Flats, Inc. by Brown & Root, Inc. (B&R) as Deliverable No. 412 of the Rocky Flats Solar Pond/Pondcrete Stabilization Project. The purpose of the study is to provide EG&G with a tool to access their support requirements to the process trains. This report is based on initial assumptions. As such, it provides a starting point for EG&G to commence their analysis. Conclusions and recommendations were not requested, however, some have been highlighted to assist EG&G in this analysis. B&R has contractually provided its services as a subcontractor to Halliburton NUS (HNUS), the project's prime contractor. The study is being executed in two phases. This document is Phase I, and identifies the tasks to be performed by EG&G. These tasks primarily consist of providing material input to and output from the process. The process, referred to as the "black box" is provided and operated by HNUS. Phase II will simulate the process functions of the "black box" and will assure their interface compatibility with the input and output tasks performed by EG&G with particular emphasis on identifying and eliminating processing and material handling bottlenecks.

## 1.1.1

Process Trains - 'Black Box'

This project is comprised of two separate process trains, Pond Sludge Processing primarily located on the 750 Pad and Pondcrete/Saltercrete Reprocessing located on the 904 Pad. For the purpose of this study, EG&G will provide input material to the process ("black box") and take output material from the "black box."

Several process design options have been analyzed during study preparation. These options are described in the History of the Material Handling Study in Section 2.0 and the Design Basis Memo's for Pond Sludge and Pondcrete that have been issued. The options currently under consideration and detailed in this report are:

Pond Sludge ProcessingLow Water Ratio Process Configuration

The Low Water Ratio Configuration processes the sludge in Ponds 207A, 207B-North, Center and South with the minimum associated water. During the processing the sludge will be dewatered and the filtrate water will be returned to the ponds for evaporation. The liquid layer currently covering the sludge will be significantly reduced in volume by EG&G's evaporators for subsequent stabilization. All of the material in Pond 207C, the clarifier tank and the evaporator bottoms will be processed on the 750 Pad, since this material is already saturated with salts, thus cannot be reduced further in volume.

### High Water Ratio Process Configuration

The High Water Ratio Process Configuration processes all of the contents (sludge, sediment, liquid etc.) of Ponds 207A, 207B-North, -Center and -South plus Pond 207C, the clarifier tank bottoms and evaporator bottoms. In this case, EG&G's evaporators would not be utilized

### Pondcrete/Salterete Reprocessing

### Comix with Trash Removal Process Configuration

- The Comix with Trash Removal Process Configuration provides a process which crushes the existing Tri-walls and half crates of Pondcrete and Salterete. Tri-walls in "Metals" will be removed before crushing. After crushing, separation equipment will be provided to remove the crushed, non-waste material (which consists of cardboard, wood and plastic), referred to as trash, from the process stream. Pondcrete and Salterete will proceed to the stabilization process while trash will be dewatered and packaged.

#### **1.1.2 Material Handling Objectives**

The specific objectives of this Phase I study are

1. Design basis for the materials to be handled.
  - Material input to the process Tri-walls, metal containers, half crates, water, cement, etc
  - Material output from the process Half crates of Pondcrete or Salterete, full crates of various waste materials, such as pallets, plastic bags, cleaning materials, etc
2. Identify and describe the sampling procedures and timing for regulatory and quality control tests to be performed. These were to include, but may not be limited to smear tests, TCLP tests, EPA tests, and DOT tests
3. Define health and safety design criteria
4. Finalize block flow diagrams for materials handling
5. Develop materials handling equipment arrangement drawings based on preliminary equipment selection

- 6 Define probability distribution for all process/manufacturing/sampling/testing nodes
7. Program preliminary simulation models for each proposed scenario, with the output of stabilized waste form products capacity set at a nominal 20 tons per hour (TPH)
- 8 Run the model and analyze output from the simulations and make adjustments as necessary
- 9 Prepare a preliminary draft of the study report, which would include the following for the three scenarios studied in detail
  - Mass flow and piece count balance of the inputs and outputs of the process - See Section 6.0
  - Identify the input and waste removal requirements of EG&G. - See Sections 3 0 and 6 0.
  - Describe the preliminary plan of operations. - See Section 3 0
  - Provide manning chart and mobile equipment requirements. - See Sections 7 0 and 8 0
  - Provide computer simulation statistics. - See Section 5 0
10. Evaluate material handling with the intent to minimize EG&G manpower and forklift utilization

The study was to simulate the six primary process design scenarios out of the possible twelve under consideration at that time. The six primary scenarios were

- 1 Pondercrete/Saltercrete - Wet process, strip Tri-wall separate and remove trash, and pour cemented waste directly into Tri-walls inside of half crates. This plan was later changed for all scenarios to pour directly into half crates with no Tri-walls
- 2 Pondercrete/Saltercrete - Dry process, strip Tri-walls separate and remove trash, and pour waste directly into half crates
- 3 Complete Comix of Tri-wall inner wrappings, wet process, pour trash and waste directly into half crates
- 4 Complete Comix of Tri-wall inner wrapping, wet process, separate and remove trash after Comix, pour waste directly into half crates.

- 5 Pond Sludge - High Water Ratio Process, pour directly into half crates
- 6 Pond Sludge - Low Water Ratio Process, pour directly into half crates

## 1.2 Assumptions

### 1.2.1 Pond Sludge Processing - Assumptions

- The quantities of pond waste to be processed are based on pond and sludge level data contained in the Weston Solar Pond Sampling Report, July, 1991. These quantities are somewhat different from those listed in Project Plan Rev. 8, however comparison of the two sources of data lead to the same conclusions.
- Rejected stabilized waste from the Pond Sludge Processing will not exceed 3% of the total output of stabilized waste.
- The existing waste that is to be reprocessed on the 904 Pad that is located on the 750 Pad will be removed by EG&G prior to the installation of process equipment.
- Clarifier sludge and evaporator bottoms will be processed at the 750 Pad. The type of delivery containers needs to be resolved.
- Pondsludge will be processed prior to Pondcrete and Saltcrete reprocessing.

### 1.2.2 Pondcrete/Saltcrete Reprocessing - Assumptions

- The quantities of existing waste to be reprocessed are based on Pondcrete/Saltcrete Inventory Weekly Report, dated week ending 04/28/91. These quantities are somewhat different from those found in the most recent inventory reports, however comparison of the two sources of data lead to the same conclusions. This issue of existing waste in drums needs to be discussed.
- The Saltcrete inventory will increase at 30 half crates per month during the project.
- Rejected stabilized waste from the Pondcrete/Saltcrete Reprocessing will not exceed 3% of the total output of stabilized waste.
- All metal (Metals) containers, immediately after being emptied will be decontaminated by EG&G and removed from 904 Pad.



- All existing stabilized waste presently stored where equipment will be erected, will be moved from the existing 904 Pad area, to allow for installation of process equipment.

### 1.2.3 General Assumptions

- The ratio of solids in the waste (aggregate) to cement addition will not exceed 3 parts aggregate to 1 part cement
- A complete set of quality control samples will be taken from every fifth half crate of stabilized waste produced. This rate may change as the process design and quality control philosophy for the processing schemes evolve.
- EG&G will provide for sufficient area and volumetric permits to store: the existing Pondcrete/Salterete inventory, and the stabilized waste generated, while allowing adequate room for process and material handling equipment
- The Nevada Test Site is temporarily shut down, therefore precluding processed stabilized waste shipping from the Rocky Flats Plant during waste processing
- Each of the two processes will be operated 16 hours per day, 6 days per week. The operators will work 10 hour shifts with 1 hour to suit up for work and 1 hour after work to clean up. EG&G will provide as necessary, 24 hour, 7 days per week support
- Only one process train (Pond Sludge Processing or Pondcrete/Salterete Reprocessing) can be operated at any given time due to the lack of EG&G personnel and support services.
- This study is based on maintaining existing tent configurations on the Pads for storage purposes. However, final process equipment selection may dictate modifications to the tents

## 1.3 Conclusions

### 1.3.1 Pond Sludge Processing - Conclusions

- 3.3.1.1 Pond Sludge Processing by the Low Water Ratio process configuration results in a quantity of stabilized waste that will not exceed the Pad's permitted stabilized waste volumetric limit

+ Volumetric Storage Limit	14,000 Cubic yards
- Total Generated Stabilized Waste and Trash	<u>9,069</u> Cubic yards
Difference	4,931 Cubic yards

1 3.1.2 Pond Sludge Processing by the High Water Ratio process configuration results in a quality of stabilized wastes that can not physically be stored on the 750 Pad and exceeds the Pad's permitted stabilized waste volumetric limit

--	+ Volumetric Storage Limit	14,000 Cubic yards
	- Total Generated Stabilized Waste and Trash	<u>35,749</u> Cubic yards
	Difference	-21,749 Cubic yards

1.3.1.3 An additional 117,000 to 175,000 square feet of permitted Pad area will be required should the High Water Ratio Process Configuration be selected. This is somewhat larger than two football fields. The actual area needed will be dictated by the maximum half crate storage height used and the room required for fork truck aisles. The square footage noted are minimum requirements and provides no allowance for growth in the quantity of stabilized waste generated which could be necessitated by more water in the ponds, etc

1 3 1 4 Pond Sludge processing and material handling can be operated at an average rate of 20 tons per hour of stabilized waste measured at the casting station.

1.3.1.5 The semi-automated material handling system will cost approximately \$1,875,000 to \$3,150,000 un-installed. The price will be determined by the specific equipment selected.

1.3.1.6 EG&G Manning Requirements (with semi-automated material handling system and Low or High Water Ratio Process Configuration) for two shifts/day

Chemical Operators	14
Waste Inspectors	8
Radiological Technicians	4
Carpenters	8
Painters	2
Fork Truck Operators	4
Mechanic	2
<u>Electrician/Instrument Tech</u>	<u>2</u>
Total	<u>48</u> per day

1 3 1 7 EG&G Fork Truck Requirements (with semi-automated material handling system and Low or High Water Ratio Process Configuration)

<u>Work Station</u>	<u>Number of Fork Trucks per Day</u>
207 Pad Trash Removal	1
Casting Station	1
Stabilized Waste Storage	6
<u>Spare Fork Truck in Reserve</u>	<u>1</u>
Total Number of Fork Trucks	<u>9</u>

1.3.2 Pondcrete/Saltcrete Reprocessing - Conclusions

1.3.2.1 There is not enough area available on the 904 Pad to store the total existing inventory of Pondcrete and Saltcrete contained in Tri-walls, Half Crates and Metals, and have sufficient room for installation of HNUS's process equipment and EG&G's material handling equipment.

There is not enough permitted volume on 904 Pad to store all the existing Pondcrete and Saltcrete currently stored on 750 and 904 Pads

1.3.2 2 Pondcrete/Saltcrete Reprocessing by the Comix with Trash Removal process configuration results in a quantity of stabilized waste that can not be physically stored on the 904 Pad and far exceeds the Pad's permitted volumetric waste limit. It should be noted that none of the other process configurations considered would produce significantly less stabilized waste

+ Volumetric Storage Limit	9,950 Cubic yards
- Total Stabilized Waste and Trash Generated	<u>16,514</u> Cubic yards
Difference	-6,564 Cubic yards

1 3 2 3 An additional 65,000 to 88,000 square feet of permitted Pad area will be required. The actual area need will be dictated by the maximum half crate storage height used and the room required for fork truck aisles. The square footage noted are minimum requirements and provide no allowance for growth in the quantity of stabilized waste generated, which could be necessitated by increased percentage of rejects, etc.

1.3.2.4 Pondcrete/Saltcrete Reprocessing and Material Handling can be operated at an average rate of 20 tons per hour of stabilized waste measured at the casting station.

1.3 2.5 The semi-automated material handling system equipment will cost approximately \$ 2,125,000 to \$3,400,000, un-installed. The price will be

1.3.2 6 EG&G Manning Requirements (with semi-automated material handling)

Chemical Operators	28
Waste Inspectors	12
Radiological Technicians	6
Carpenters	12
Painters	4
Fork Truck Operators	12
Mechanic	4
<u>Electrician/Instrument Tech.</u>	<u>2</u>
Total	<u>80</u> per day

(Note: The increase in Manning from Pond Sludge Processing is primarily the result of trash packaging and storage )

1.3.2.7 EG&G Fork Truck Requirements (with semi-automated material handling)

<u>Work Station</u>	<u>Number of Fork Trucks per Day</u>
Waste Input	6
Casting and Trash Stations	2
Stabilized Waste Storage	6
<u>Spare Reserved</u>	<u>1</u>
Total	<u>15</u> per day

(Note: The increase in fork trucks from Pond Sludge Processing is primarily the result of trash packaging and storage )

1 4 Recommendations

1 4 1 Pond Sludge Processing

Proceed with design of the Low Water Ratio Process Configuration and cease all work on the High Water Ratio Process

(This action is already in effect as a result of the initial data from this study and EG&G's review of Design Basis Memo - Pond Sludge )

**1 4 2      Pondcrete/Saltcrete Reprocessing**

Obtain additional Pad storage area and volumetric storage permit to provide room for interim storage of the existing Pondcrete/Saltcrete contained in Tri-walls, half crates and metals, and to provide room for storage of the generated stabilized waste product

**1.4.3      Both Process Trains**

Consider allowing the use of more fork trucks by redirecting Material Handling Study efforts towards a more economical, manual material handling and stacker/retrieval system

## 2.0

## HISTORY OF THE MATERIAL HANDLING STUDY

### 2.1

### Introduction

EG&G and Halliburton NUS (HNUS) met on March 5 and 6, 1991 to kickoff Halliburton's effort on the Rocky Flats Solar Pond/Pondcrete Stabilization Project. During a meeting on March 27, 1991, Robert Forrey and Steve DeWitt of EG&G explained the experiences they gained during EG&G's 1990 effort to reprocess Pondcrete stored in Tri-wall containers on the 904 Pad. In their opinion there are two major criteria in order to develop an efficient high production rate process: one, minimize the manual unwrapping of Tri-wall containers and two, develop an efficient material handling plan.

This "Material Handling Study" was first described in B&R Interoffice memo from Wayne Henderson to John Zak, dated April 24, 1991. The memo explained the Client's need for the study, defined its overall scope and goals, and outlined a plan of execution. In addition, the memo briefly described several process configuration options that should be considered by the study.

The "Material Handling Study" was redefined in a B&R Interoffice Memorandum from Larry O'Quinn to John Zak dated May 15, 1991.

Seven process manufacturing simulation computer software packages were investigated. A software package known as ProModel/Level II manufactured by Production Modeling Corporation of Utah was recommended by B&R and purchased by EG&G.

This Section will review the work done to date using this software package.

### 2.2

### The Analytical Process

#### 2.2.1

Definition of terms related to process scenarios and options studied (please see illustration 2 2 1-1 and map 2 2 1-2 )

Pond Sludge Processing is the process that stabilizes the wastes from Ponds 207A, 207B-North, 207B-Center, 207B-South, 207C and bottoms from the existing clarifier and evaporators.

Low Water Ratio Process refers to a process that removes water in ponds 207A, 207B-N, 207B-C and 207B-S in excess of that needed for stabilization and evaporates it, therefore minimizing process output in the form of stabilized waste.

The total quantity of liquid and sludge from Pond 207C and the clarifier and evaporator bottoms would be stabilized.

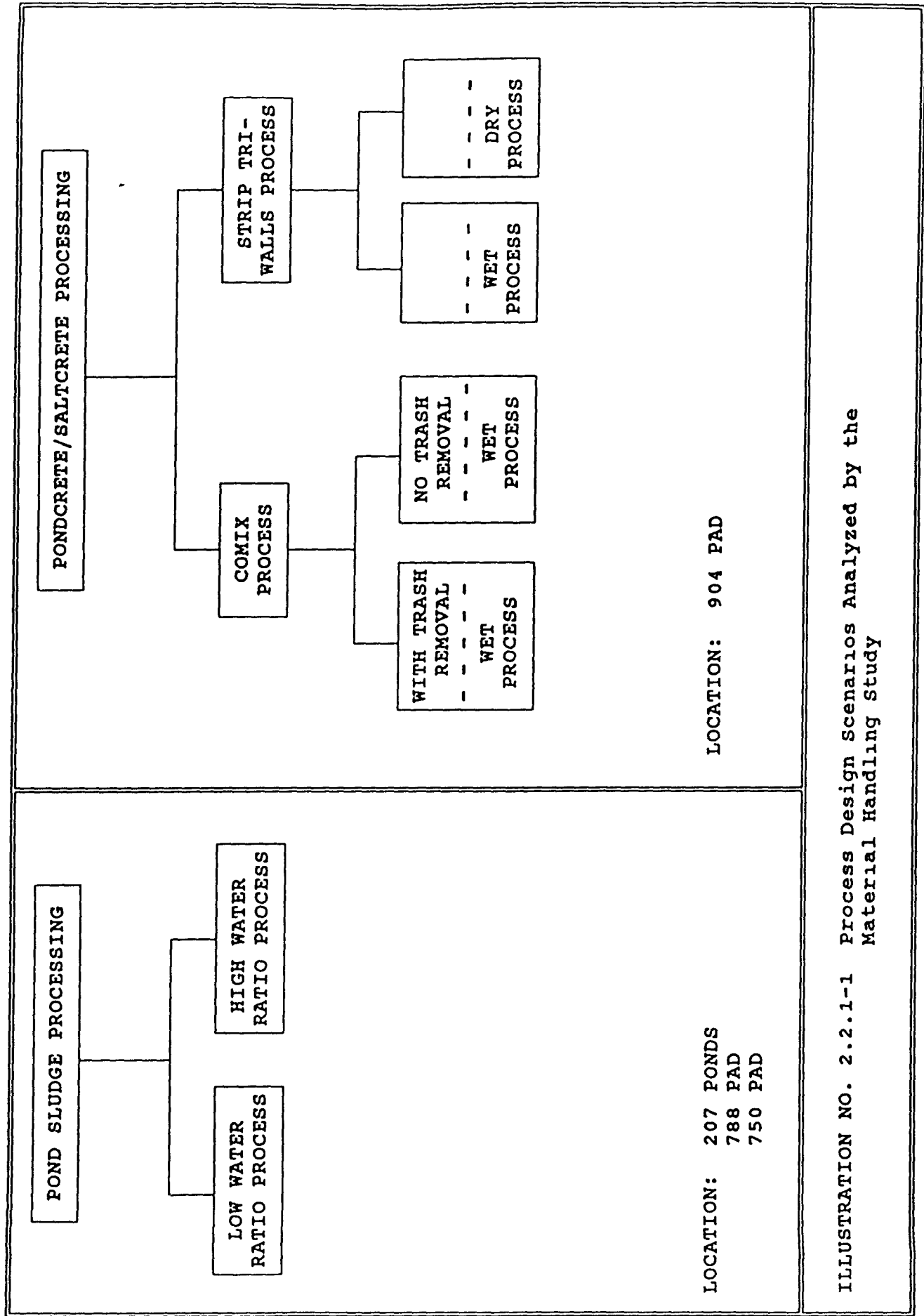
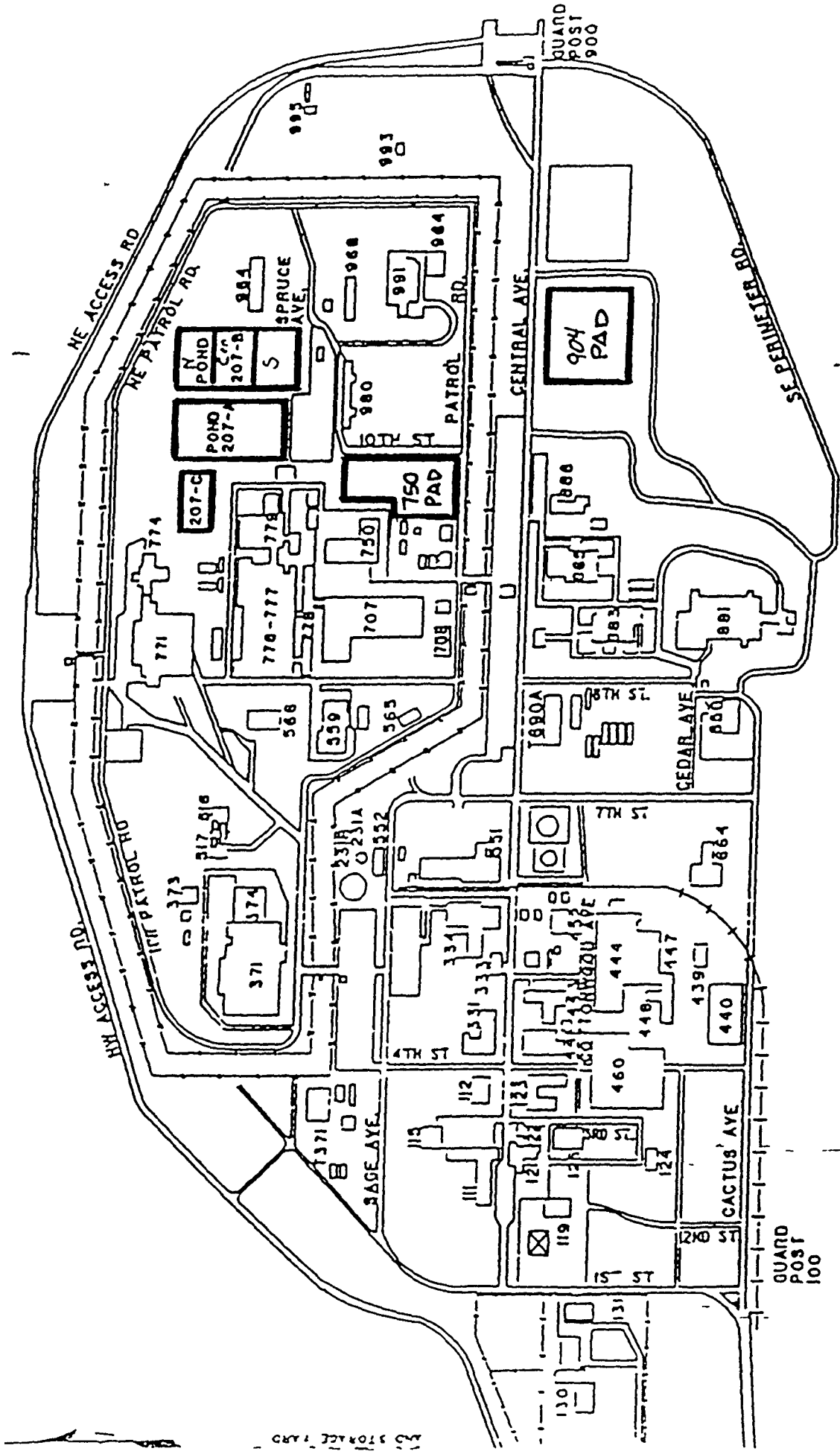


ILLUSTRATION NO. 2.2.1-1 Process Design Scenarios Analyzed by the Material Handling Study



MAP 2.2.1-2

ROCKY FLATS AREA PLOT PLAN

REVISION OF AREA PLOT PLAN 3/80

2-2.1



High Water Ratio Process refers to processing the entire contents, liquid and sludge, of Ponds 207A, 207B-N, 207B-C, 207B-S, 207C, the clarifier and evaporator bottoms.

Pondcrete/Saltcrete Reprocessing is the process that stabilizes the existing uncertifiable Pondcrete and Saltcrete. The existing Pondcrete and Saltcrete is stored in Tri-walls, half crates, and metal containers (Metals) on 750 and 904 Pads.

Comix Processing refers to a process that crushes the existing Pondcrete and Saltcrete along with their storage containers, pallets, and PVC bags. Tri-walls currently stored in metals are removed prior to crushing.

Following the Comix crushing operation, two options have been evaluated:

- With Trash Removal refers to a process that separates the trash (crushed containers, pallets, and wrappings) from the existing crushed Pondcrete or Saltcrete. The crushed Pondcrete or Saltcrete is stabilized with cement while the trash is dewatered, and deposited in full crate containers.
- No Trash Removal refers to a process where the crushed waste and trash are not separated prior to stabilizing with cement.

Strip Tri-Wall Process refers to a process where the existing Pondcrete and Saltcrete container material is manually removed, prior to crushing the Pondcrete or Saltcrete. The manual removal process would apply to both Tri-walls and half crates and would require removing all pallets, fiberboard liner, and PVC plastic bags in addition to the corrugated cardboard Tri-walls or plywood half crates.

Wet Process refers to a process that adds water to the Pondcrete or Saltcrete during or following crushing. This would facilitate handling the Pondcrete or Saltcrete as a slurry and minimize dusting and air emission problems. Excess water is then removed and recycled prior to cement stabilization.

Dry Process refers to a process that would handle the Pondcrete or Saltcrete in an "As Is" condition for primary crushing, dry it, crush to final size and then add in only enough water for cement stabilization.

## **2.2.2      Process Analysis**

### **2.2 2 1      Pond Sludge Processing**

Both Low Water and High Water Pond Sludge Processing Scenarios were being evaluated at the time this report was started. The results of this study were used in consideration of which process to select. Thus, the remaining sections of the report discuss each scenario.

The reader should be aware that the Low Water Ratio Process Scenario was recently recommended by B&R and subsequently selected by EG&G prior to the completion and issue of this study.

### **2 2.2 2      Pondcrete/Saltcrete Reprocessing**

#### **2.2 2.2.1      Strip Tri-walls**

##### **Introduction**

The Strip Tri-wall approach to Pondcrete/Saltcrete Reprocessing was similar to the method used by EG&G in their reprocessing campaign of 1990. The approach conceived by B&R was functionally similar, but added machinery to speed up the basic process. The following is a brief description of the analysis that was done and the conclusions drawn.

##### **EG&G's 1990 Reprocessing Experiences**

During 1990 EG&G reprocessed some of the existing Pondcrete that was stored in Tri-wall containers on the 904 Pad.

Individual Tri-walls, each resting on a pallet, were delivered by a four wheeled fork truck to the Tri-wall entry portal of a permacon. The Tri-wall was deposited on an idler roll conveyor, which extended through the portal opening. The portal opening was covered by a wind curtain made of clear plastic flaps. The four wheeled fork truck then pushed the Tri-wall over the idler rolls through the entry portal. A three wheeled fork truck stationed inside the permacon separated the Tri-wall container from its pallet and set the Tri-wall on a platform (or cage) ahead of the hopper for a Morgan Slurry feeder.

Operators working inside of the permacon were dressed in full Tyvek suits and wore hoods and respirators. They were limited to 1-1/2 to 2 hours of work at a time and were allowed to work one period in the morning and one in the afternoon due to heat stress.

The nylon straps, plastic bags, and Tri-wall cardboard containers were manually cut by linoleum and Xacto knives and stripped by hand. This was difficult for the operators to do since they were wearing multiple layers of gloves, which were taped to the sleeves of their Tyvex overalls.

The physical characteristics of the Pondcrete varied from granules of wet sand to a semi-liquid tooth paste consistency.

The best production rate the operators were able to achieve was 5 Tri-walls in 8 hours. At 1100 pounds of Pondcrete per Tri-wall this equates to 0.34 tons per hour

### B&R's Conceptual Tri-Wall Stripping Design

B&R's approach to stripping Tri-walls was specifically aimed at eliminating or minimizing the problems encountered by EG&G. The following is a description of some of the ideas investigated.

- The Tri-wall container with pallets to be reclaimed from storage by four wheeled fork trucks and then placed on roller conveyors. The new roller conveyors would be driven by chains and sprockets. The rolls would be small and located on the closest possible center distances to minimize jostling the Tri-walls as they are conveyed. In addition, turn tables were provided at intersections and turns so the boards on the bottom of the Tri-wall pallets would always be aligned at a right angle with the conveyor rolls.
- Southwest Research Institute was contracted to investigate ultrasonic non-destructively testing the Tri-walls to determine the consistency of Pondcrete/Saltcrete without removing it from the Tri-wall. It was believed this might provide the operator with knowledge which would be useful in determining how best to strip the Tri-wall prior to cutting into the container and risking leakage. This NDT method did not prove to be effective enough for the above purpose.
- The steps required to efficiently strip a Tri-wall container were analyzed. Notes from the analysis are provided as Exhibit "R" of the Appendix. The analysis envisioned the use of a specially designed and manufactured manipulator to pick up, rotate and position Tri-walls. A drum manipulator manufacturer was contacted. His engineering department reviewed the scheme outlined in the study and estimated the equipment cost of the manipulator to be \$60,000 to \$75,000 each. It was estimated that using manipulators, individual Tri-walls could be stripped in 30 to 60 minutes. This was significantly faster than had previously been done. The stripping would still be manual.

- The use of a laser was investigated as a more efficient method of cutting the Tri-walls. Carbon dioxide lasers could quickly cut through the Tri-wall cardboard and plastic. A small CO<sub>2</sub> laser cost about \$50,000 with another \$5,000 required for a laser chiller. However, the laser has the disadvantage, like the knives and other cutting devices, of potentially cutting through a Tyvek suit and hence injuring an operator. The solution to this problem is for the laser and object to be cut inside an enclosure with the operator outside looking through glass walls. Glass is sufficient to protect the operator. The cost of an enclosure with laser and manipulator was estimated at \$150,000 to \$250,000 each.
- A preliminary equipment arrangement layout was prepared and is provided as Drawing No. 2-2-2-1 in the plastic pocket following this page. The layout had a "Classification Test Rack," located in Shelter No. 9, which assumed a method of non-destructively determining the consistency of the Pondercrete or Saltcrete. Twenty manual stripping stations were located inside of Shelter No. 10. This assumed one Tri-wall could be stripped per hour per station, which is faster than had been accomplished previously, but seemed to be a conservative estimate with the mechanical handling equipment envisioned. The total amount of material handling equipment pictured on the layout took up three of the four tents available and did not include the complete processing train, the waste handling system, waste shredding/compaction, new and empty half crate handling, metals handling and room for storage of stabilized waste.
- A very rough estimate of the cost of just the 20 stripping stations would be approximately \$5,000,000.
- A rough estimate of the manpower requirements for operating just the stripping stations with manipulators would be 108 operators per day, not including the personnel required to support this number of operators. Without manipulators at least 200 operators will be required.

### Conclusions

Stripping Tri-walls is not a satisfactory process scenario for a production rate of 20 tons/hour of stabilized waste for the following reasons:

- Large Pad area requirements
- Safety risks for operators, including increased exposure of operators to the waste source
- Labor intensive
- High capital cost

For these reasons, the Stripping Tri-walls process scenario's were abandoned in favor of the Comix Processing Scheme.

#### 2.2.2.2.2 Comix

The Comix approach to Pondcrete/Saltcrete processing was developed to eliminate the problems associated with stripping the Tri-wall and half crate containers from the waste. The major element of this system is the primary crusher, which must be capable of accepting and crushing Tri-walls and half crates filled with waste. Two types of machines have been identified that achieve this goal, the Auger type shredder manufactured by Komar Industries and ring shredder types from SSI Shredding Systems, Inc., Shred-PAX, and others.

Surrogate tests have been run on the Komar unit. These tests included crushing surrogate concrete castings contained in Tri-walls and in half-crates. The physical consistency of the castings varied from a hard low strength concrete like material dry to a wet sticky material similar in texture to tooth paste. The tests were successful and demonstrated the Komar machine's ability to process the wide variation in waste form physical characteristics along with associated trash. The tests also verified the machines' ability to meet and exceed the 20 ton per hour processing rate requirement of the project.

Following the crusher the non Pondcrete/Saltcrete material can remain with the waste or be separated and removed as trash. Comixed waste with trash removed is essentially the same waste form as stripped Tri-walls. Stripped Tri-wall waste has been certified as acceptable for cement stabilization. Stabilization of comixed material without trash removed is possible, but it would require certification, which is not acceptable to this project, in view of the time constraints. Based on our calculations of the weight of the various container components, approximately 4% of the final waste form would be trash material, if the trash material was cast into final waste form.

#### Conclusions

- Tri-walls and half crates of previously processed waste can be successfully crushed to a satisfactory size and at an acceptable flow rate.
- Comix with trash separation and removal meets the requirements of the existing certified stabilized waste.
- Comix without trash separation, as currently understood, does not meet the requirements of the existing certified stabilized waste and would require a great deal of time for certification.

Based on the above, Comix with trash removal process scenario was selected as the process to proceed with.

### **3.0**

## **MATERIAL HANDLING SYSTEM DESCRIPTION**

### **3.1**

#### **Introduction**

The material handling systems for the input of both process trains (Pond Sludge Processing and Pondcrete/Saltcrete Reprocessing) are quite different since the former processes a liquid slurry while the latter processes discrete packages (Tri-walls, half crates and metals). However, the output systems are identical. This section is a functional description of a material handling system that will satisfy the requirements for this study. Also included are 'ball park' capital cost estimates of the material handling systems for the output portions of the process.

### **3.2**

#### **Functional Description**

#### **3.2.1**

##### **Inputs to the Process**

##### **3.2.1.1**

Waste inputs to the Pond Sludge Process are handled as liquid slurries. These slurries are conveyed in pipes, moved by pumps and stored in tanks. These devices are not described in this report, but are described in the "Design Basis Memo - Pond Sludge Processing".

##### **3.2.1.2**

Waste inputs to the Pondcrete/Saltcrete Process are handled as discrete packages, such as: Tri-walls, half crates, and metal containers (metals). The Comix process provides for primary crushing of the waste without removal from the storage container except that the triwalls are removed from the metals. Drawing No. 3.2.1-1 contained on the following page illustrates the scheme envisioned for feeding input waste forms to the primary crusher.

- Tri-walls will be retrieved from storage, one at a time, and placed on the tilt table of the primary crusher infeed system by fork truck, which will be provided and operated by EG&G. The Tri-walls will be in the "as is" condition, which includes outer pallet, outer PVC bag taped in place, inner pallet, inner nylon straps, Tri-wall container, inner PVC bag and Pondcrete or Saltcrete. One, two, or three Tri-walls at a time can be set on the tilt table and fed to the primary crusher. The tilt table will automatically incline and deposit Tri-walls into the skip hoist buckets when the primary crusher feed controls sense the need for additional feed and the safety restraints, such as the fork truck being out of the gallery and the skip hoist bucket in the bottom position has been satisfied. The skip hoist will raise the Tri-walls to the top of the primary crusher and dump them through an air lock into the top infeed of the crusher.

The tilt table and skip hoist assembly will be contained inside of a gallery and be maintained at a negative pressure by an exhaust air system. To prevent dust leakage, the exhaust air system will pull air through the gallery, and discharge it to the atmosphere through a HEPA filter.

The opening for the fork truck's access to the tilt table will be covered by a plastic strip wind curtain.

- Half crates, due to their size, will be introduced the same way, but one at a time. Prior to the half crates being placed on the tilt table external steel straps will be snipped off the half crates and placed in full crates, as trash. This is done to minimize the possibility of a piece of strapping material becoming hung up in the system before reaching the tramp metal removal magnet.
- Metals will be up-ended over the tilt table so that contents of pallets and Tri-walls can transfer to the tilt table. A special manipulator must be designed and fabricated to lift, turn and jostle the metals. The metals will not go into the primary crusher, but will be decontaminated and removed from the 904 Pad by EG&G.

**Note:** The supply to the process system of Tri-walls, half crates and metals will be via EG&G fork trucks and operators.

#### **3.2.1.3**

Empty half crates will be delivered to the Pad on flat bed trailers by EG&G. An EG&G fork truck operator will transfer the empty half crates from the trailer to an infeed conveyor system. The roller conveyor will have a sufficient number of accumulating sections to facilitate efficient trailer unloading.

The conveyor infeed system will act as a half crate queuing area prior to the preparation area.

Half crates will be individually advanced from the conveyor infeed system to a visual inspection station. Each crate will be inspected for any physical damage or defects. Any defective half crates will be conveyed out of the material handling system, to be reloaded by an EG&G fork truck operator onto an EG&G flat bed trailer for return to the manufacturer.

Acceptable half crates are advanced to the preparation station where a PVC liner, cardboard bottom and cardboard sidewall liner will be installed by two HNUS laborers. Metal binder spring clips will be used to hold the PVC liner and cardboard sidewall liner in place. In addition, pipe clamps will be installed across the open top of the half crates to prevent the side walls from bulging when stabilized Pondcrete is pumped in.

These prepared half crates are then conveyed to a queuing area of accumulating roller conveyors where they are temporarily staged prior to the casting station.

### **3.2.2 Output from the Process**

#### **3.2.2.1 Casting Station**

Prepared half crates are rolled into the casting station, comprised of a roller conveyor on load cells. Two HNUS operators will fill the half crates to a gross weight limit of 4500 pounds. This EG&G limit is the maximum acceptable safe lifting weight for the existing fork trucks. The density of the stabilized concrete will fluctuate with the density of the input waste, so the level of stabilized waste in the half crates will vary for a fixed weight. Consideration is being given to providing vibrators to help eliminate air from the stabilized waste slurry.

Quality control waste samples will be taken by a HNUS sample technician. Currently, one sample per five half crates is planned, however the final ratio will be compatible with the process design and quality control requirements. Each set of quality control samples will include a one quart paint can full of stabilized waste for DOT Test No. DOT 49CFR173, and four 2 inch diameter x 4 inch long tapered test cylinders for NVO-325-2.2.2-D test, EPA Test 9095, ASTM D 4359-84 and a HNUS compression test.

From this point forward, all personnel will be EG&G, as the exit point for the process is the pouring spout.

#### **3.2.2.2 Labelling Station**

Filled half crates will be conveyed from the Casting Station to the Labelling Station. At the Labelling Station an EG&G chemical operator will attach five standard documents, plus a bar code label sheet, all provided by EG&G. The standard documents are comprised of (1) "Certification of LLW" (RF-47237, Rev. 12/88) sheet, (2) "Pondcrete Box Log Sheet" (RF-47237, Rev. 12/88), (3) Plutonium Contaminated Waste, Radioactive LSA Sheet (RF-34510, Rev. 12/89), (4) "Pondcrete Reprocessing Check Sheet", and (5) Waste Certification Checklist for Pondcrete".

**3.2.2.3** After labeling, each half crate will be conveyed to one of two inspection stations. Each inspection station will be manned by an EG&G Waste Inspector who performs a visual test of the half crate container and an EG&G Radiological Technician who will perform a smear test. Containers that fail either test will be conveyed to a cleanup station at which two EG&G chemical operators will clean the half crate container. Cleaned half crates are re-entered into the testing station where the tests are repeated. Acceptable half crates are then transferred to the automated curing system.



#### **3.2.2.4 Automated Storage and Automated Retrieval System for Curing**

The automated system is comprised of stationary racks with sufficient bins for storing the stabilized waste during 48 hours of curing. The design is based on a production schedule of two 10 hour shifts per day (effective production time of 8 hours per shift). The half crates can be inserted and retrieved from the storage slots by automated unmanned stacker cranes or automated guided vehicles. A computer based inventory control system will contain the location of each half crate at any given time. One roving EG&G chemical operator will monitor the automated curing storage area.

#### **3.2.2.5 Closure Station**

Half crates of stabilized waste, both acceptable and reject, that have cured for 48 hours are retrieved and conveyed to one of two closure stations. Each closure station is manned by an EG&G chemical operator who: removes the pipe clamps and metal binder spring clips, places them on a pallet for recirculation to the half crate preparation station, then closes and tapes the PVC liner bag and installs the card board liner top piece. Two EG&G carpenters will apply a bead of adhesive on top of the vertical half crate walls, set the half crate lid and nail it in place. One EG&G painter will then paint the appropriate labels on each half crate.

An EG&G chemical operator will clean the pipe clamps and metal binder spring clips for reuse.

#### **3.2.2.6 Closure Inspection Station**

Closed half crates will be conveyed to one of two closure inspection stations where an EG&G waste inspector will inspect the half crates for items such as the appearance of glue joints, etc. Any deficiencies are corrected and the half crates are transferred to a fork truck retrieval station.

#### **3.2.2.7 Storage**

EG&G fork truck operators transfer the half crates to their storage positions on the pad. Half crates of rejected waste will be retrieved and reprocessed as the schedule allows

#### **3.2.2.8 Trash Handling**

On the 750 and 904 Pads, smear test residue and clean up trash will be accumulated in plastic bags and stored in full crates for disposal by EG&G.

On the 904 Pad, trash that has been separated from the Comix Process will be stored in full crates. The full crates of trash will go through the same labeling, inspection and closure procedures as the stabilized waste. The trash will not require curing. EG&G fork truck operators will store the trash on the pad for future disposal

### 3.3

## Material Handling Equipment Design

### 3.3.1

## Conveyors

The conveyance of half crates can be accomplished by fork trucks, conventional mechanical conveyors and automated guided vehicles. EG&G requested that fork truck utilization be minimized, so this study examined the use of conventional mechanical conveyors and automated guided vehicles.

Several types of mechanical conveyors were considered, including belts, chains, overhead chain carriers, and powered rolls. Belts and chain conveyors were eliminated because they would be difficult to decontaminate. Overhead chain carrier style conveyors were eliminated due to the need for overhead support structures and the jerky motion that is associated with their start-up. Powered roll conveyors were selected because they are suitable for skid mounting, located directly on the pavement and the rolls should be able to be readily decontaminated.

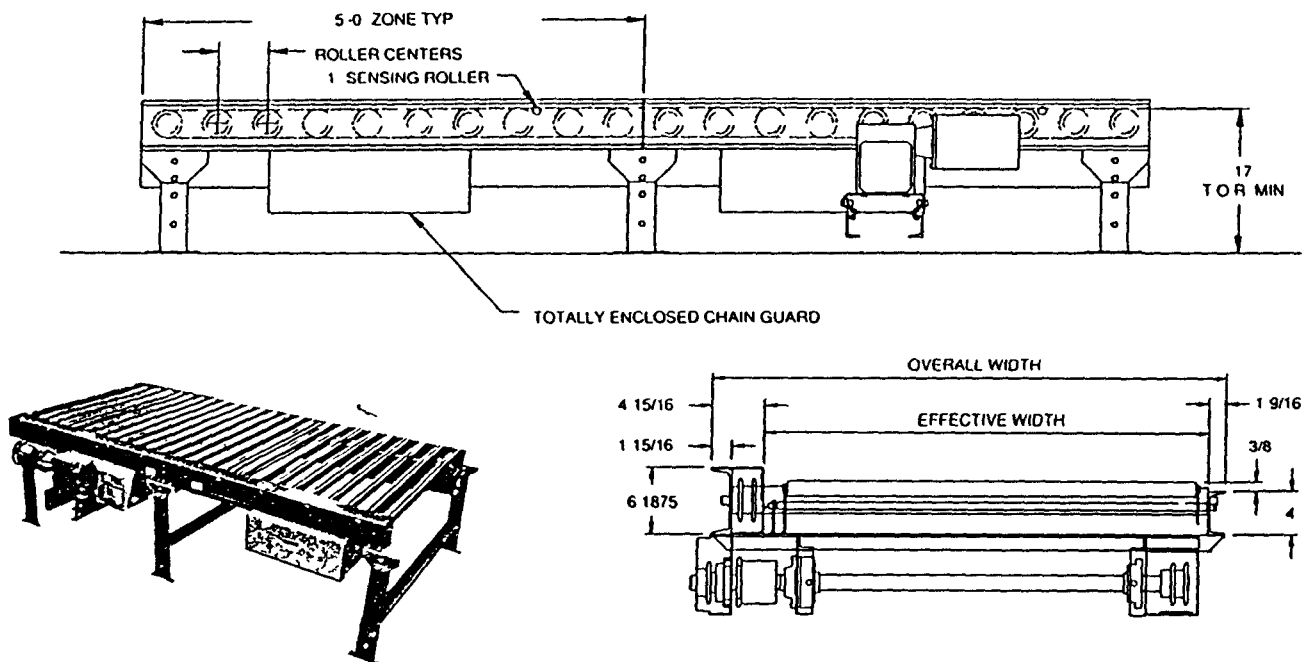


Figure 3.3.1-1 Typical Powered Roll Conveyor

The powered roll conveyors selected will be arranged with accumulating sections to act as queuing areas which will provide the operators maximum flexibility. The rolls will be heavy duty and spaced on close centers to minimize waste. The roll conveyors will be wider than the length of the half crate so the four skids mounted on the bottom of each half crates will always be at right angles to the center line of the rolls. Pallet turntables will be provided as right angle transfers to maintain this right angle alignment.

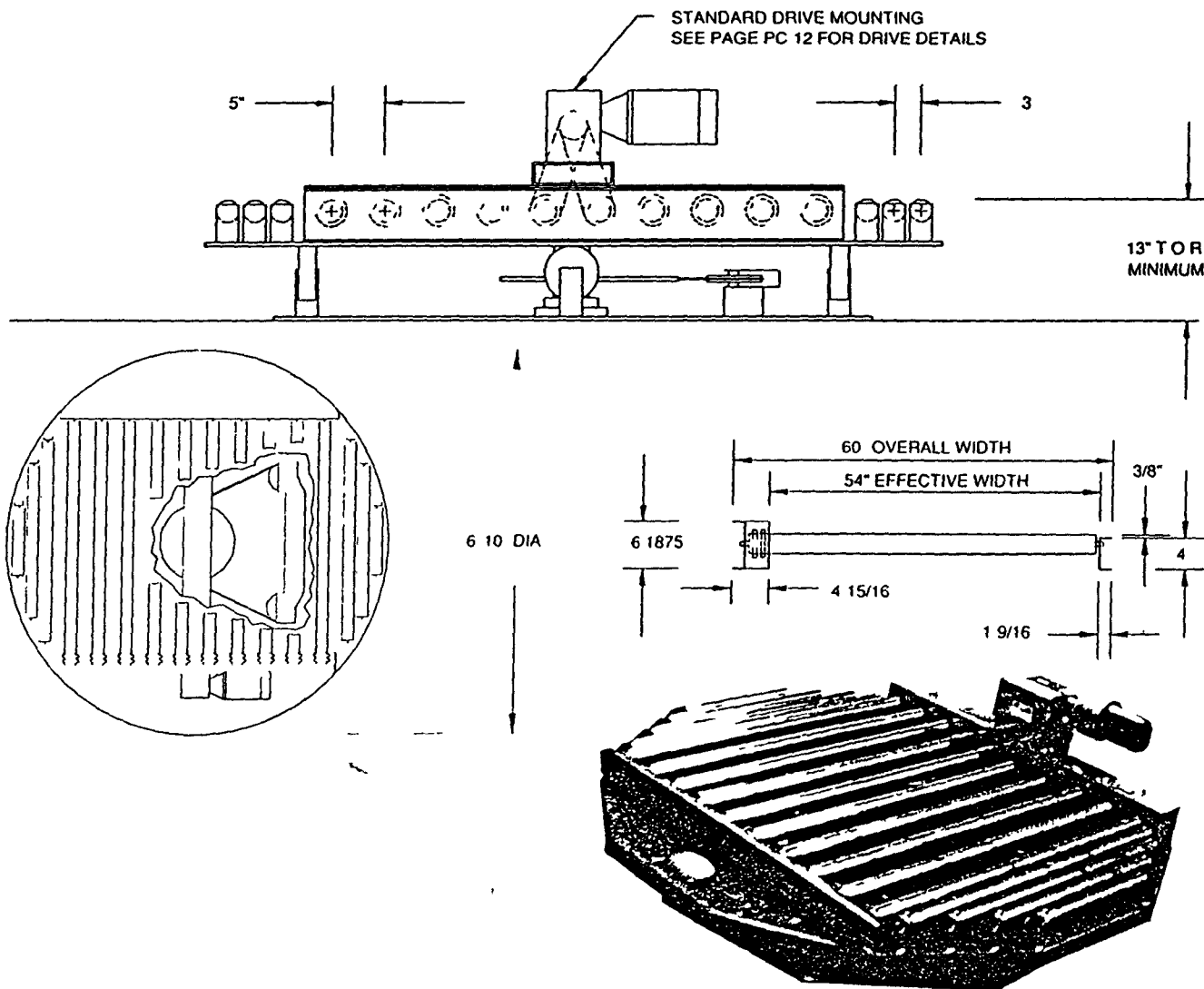


Figure 3 3.1-2  
Typical Pallet  
Turn Table

### 3.3.2

#### Automated Storage and Automated Retrieval System for Curing

An automated curing storage system was also investigated. The system was comprised of stationary racks with either automatic stacker cranes or automatic guided vehicles. There are 352 storage slots, which is sufficient for 48 hours of curing with a production rate of 11 half crates per hour for 16 work hours in a 24 hour day ( $11 \times 16 \times 2 \text{ days} = 352$ ). Note our normal production rate is 10 half crates per hour ( $10 \times 16 \times 2 = 320$ ).

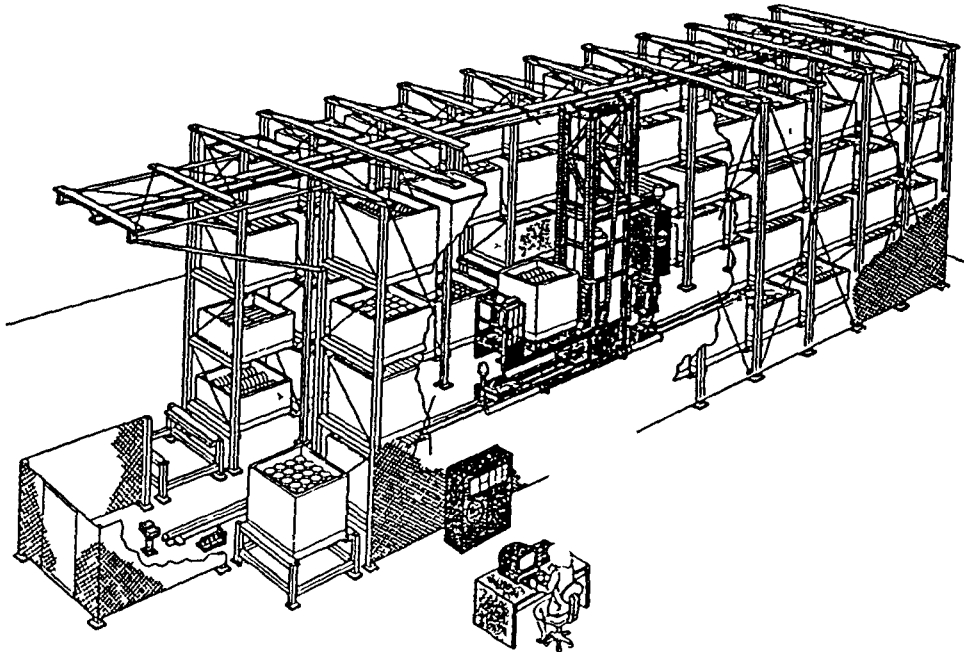
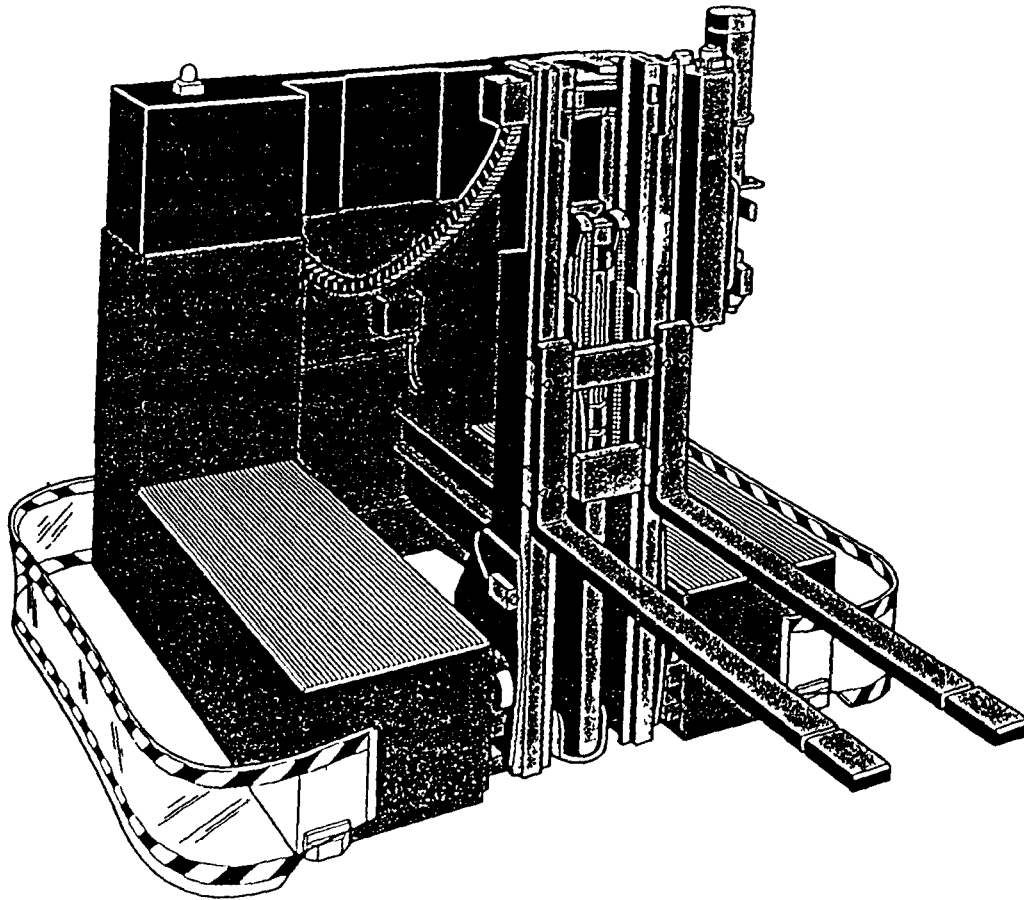


Figure 3.3 2-1

Typical Automated Stacker/Retrieval System with Conventional Automated Stacker Crane.



**Figure 3.3.2-2      Typical Automatic Guide Vehicle for Stacking and Retrieval Systems.**

The automated curing storage systems controls allow the system to operate unmanned and to track the specific location of individual half crates.

The transfer conveyors to the automated curing storage system will be arranged so that fork trucks can remove and reinsert half crates if the automated curing storage system is not functioning

3.3.3

Estimated Capital Cost of Material Handling Equipment

The following 'ball park' capital cost estimates for three material handling system options have been prepared from telephone proposals and vendor supplied unit costs. The cost listed are per pad.

<u>Material Handling System Description</u>	<u>Approximate Equipment Costs Millions of \$</u>
Powered roll conveyors and conventional stacker cranes for automated curing	\$3.150±
Powered roll conveyors and automated guided vehicles for automated curing	\$1.725±
Automated guided vehicles thru automated curing and powered roll conveyors from closure to fork truck pick up.	\$1.875±

Note: Pad 904 will require roughly an additional \$250,000 for equipment for trash packaging.

Installation costs are not included in the above numbers.

#### 4.0 INVENTORY AND STORAGE ANALYSIS

##### 4.1 Pond Sludge Processing

##### 4.1.1 Quantities of Waste Input to the Process

Source	Low Water Ratio		High Water Ratio	
	Process	Yd of Sludge	Process	Yd. of Sludge & Liquid
Pond 207A	4 Cu	Yd of Sludge	602 Cu	Yd. of Sludge & Liquid
Pond 207 B-N	660 Cu	Yd of Sludge	5508 Cu.	Yd. of Sludge & Liquid
Pond 207 B-C	760 Cu	Yd. of Sludge	4403 Cu.	Yd. of Sludge & Liquid
Pond 207 B-S	786 Cu	Yd of Sludge	4375 Cu	Yd. of Sludge & Liquid
Pond 207C	1873 Cu	Yd of Sludge & Liquid	1873 Cu	Yd. of Sludge & Liquid
Clarifier Tank	124 Cu	Yd of Sludge & Liquid	124 Cu	Yd of Sludge & Liquid
Evaporator	743 Cu	Yd of Sludge & Liquid	743 Cu	Yd. of Sludge & Liquid
-----		-----	-----	
Total	4956 Cu.	Yd (1)	17628 Cu.	Yd (2)
-----		-----	-----	

##### Reference

- (1) Weston Solar Pond Sampling Report, July 1991
- (2) Exhibit "O" of the Appendix, Table 2 Estimated Quantity from Weston Report Data, dated 23-Aug-91

#### 4 Quantities of Stabilized Waste Output from the Proc

Source	Low Water Ratio		High Water Ratio	
	Process (1)		Process (1)	
Pond 207A	8 Cu Yd of Half Crates		1279 Cu Yd. of Half Crates	
Pond 207 B-N	1265 Cu Yd of Half Crates		1381 Cu Yd. of Half Crates	
Pond 207 B-C	1462 Cu Yd of Half Crates		9243 Cu Yd. of Half Crates	
Pond 207 B-S	1600 Cu Yd of Half Crates		9106 Cu Yd. of Half Crates	
Pond 207C	2894 Cu Yd of Half Crates		2894 Cu Yd. of Half Crates	
Clarifier Tank	262 Cu Yd of Half Crates		262 Cu Yd of Half Crates	
Evaporator	1574 Cu Yd of Half Crates		1574 Cu Yd of Half Crates	
-----			-----	
Total	9065 Cu Yd. of Half Crates		35739 Cu Yd. of Half Crates	
-----			-----	
Trash	5228 Half Crates		20611 Half Crates	
4 Cu Yd of Full Crates			10 Cu Yd of Full Crates	
Total Volume of Waste	9069 Cu Yd		35739 Cu Yd	
Permitted Volumetric Limit of 750 Pad	14000 Cu Yd		14000 Cu Yd	
Difference	4931 Cu Yd Under Limit		21739 Cu Yd Over Limit	

#### References

- 1 Weston Solar Pond Sampling Report, July 1991
- 2 Exhibit "O" of the Appendix, Table 2 Estimated Quantities from Weston Report Data dated 23-Aug-91
- 3 Exhibit "P" of the Appendix, Table 1 Relationships Between Process Inputs and Ponderate Output, 3 1 Maximum Aggregate/Cement Ratio

#### Notes

- (1) Volumes listed represent the total actual internal volume of the containers the stabilized waste and trash are stored in This basis of measure agrees with the definition of the volume described by the volumetric permit It should be noted that due to weight limits, each half crate is not filled to its volumetric capacity
- (2) The volume of trash has been assumed to be one, 13 gallon garbage bag full of smear test paper, gloves, etc per day of operation



## Inventory Storage Plan

- \* Refer to Exhibit "Q" of the Appendix for Brown & Root Interoffice memorandum dated August 27, 1991, Reference. Stack Height Analysis for Half Crates of Stabilized Waste
- \* Refer to Drawing No. D-39717-0283, Sheets 1, 2 and 3 of 3 for Pad 750/Low Water Ratio - Inventory Storage Plan.
- \* Refer to Drawing No. D-39717-0282, Sheets 1, 2 and 3 of 3 for Pad 750/High Water Ratio - Inventory Storage Plan

## 42

### Pondcrete/Saltcrete Reprocessing

## 4.2.1

### Quantities of Waste Input to the Process

**SOURCE**

Existing Saltcrete			
Tri-walls	2375 Tri-walls	=	1563 Cu. Yd. Container
Half Crates	561 Half Crates	=	973 Cu. Yd. Container
Metal	145 Metals	=	601 Cu Yd. Container
<hr/>			
Total Existing Saltcrete		=	<u>3137</u> Cu Yd Container
<hr/>			
Existing Pondercrete			
Tri-walls	5806 Tri-walls	=	3820 Cu Yd. Container
Half Crates	39 Half Crates	=	68 Cu Yd Container
Metals	775 Metals	=	3210 Cu. Yd Container
<hr/>			
Total Existing Pondercrete		=	<u>7098</u> Cu. Yd Container
<hr/>			
Total Existing Waste to be Reprocessed		=	<u>10,235</u> Cu Yd. Container
<hr/>			
Permitted Volumetric Limit of 904 Pad		=	9,950 Cu Yd Container
Difference		=	285 Cu Yd Over Limit
<hr/>			
References 1	Pondercrete/Saltcrete Inventory Weekly Report, dated Week Ending 04/28/91		
Note 1	By referring to attached Drawing No. D 39717-0285, Sheet 1 of 1, it can be seen that there is not enough area to store the existing quantities of Pondercrete/Saltcrete stored on the 904 Pad simultaneously with the process and material handling equipment		

## Quantities of Stabilized Waste Output for the Process

SOURCE

Existing Saltcrete	
Tri-walls	2095 Cu. Yd. Half Crates
Half Crates	1284 Cu. Yd. Half Crates
Metals	255 Cu Yd. Half Crates
<hr/>	
Total	<u>3634</u> Cu. Yd Half Crates
	2096 Half Crates
Existing Pondercrete	
Tri-walls	5121 Cu Yd. Half Crates
Half Crates	89 Cu Yd Half Crates
Metals	2050 Cu Yd. Half Crates
<hr/>	
Total	<u>7260</u> Cu. Yd. Half Crates
	4187 Half Crates
New Waste	
New Saltcrete	936 Cu Yd Half Crates
Reprocessed Rejects	1961 Cu Yd. Half Crates
Reprocessed Q C Samples	15 Cu Yd Half Crates
<hr/>	
Total	<u>2912</u> Cu. Yd Half Crates
	1680 Half Crates
Trash	731 Full Crates
<hr/>	
Total Volume of Waste	16,514 Cu. Yd
Permitted Volumetric Limit of 904 Pad	9,950 Cu. Yd
Difference	6,564 Cu. Yd Over Limit

## References

- 1 Exhibit "P" of the Appendix, Table 1 Relationships Between Process Inputs and Pondcrete Output, 3 1  
Maximum Aggregate/Cement Ratio

## Notes.

- (1) Volumes listed represent the actual internal volume of the containers the stabilized waste and trash are stored in. The basis of measure agrees with the definition of the volume described by the volumetric permit. It should be noted that due to weight limits, each half crate is not filled to its volumetric capacity.
- (2) The volume of trash includes the containers separated as trash from the Comix stream and smear test paper, gloves, etc.

#### 4 2 3 Inventory Storage Plan

- \* Refer to Exhibit "Q" of the Appendix for Brown & Root Interoffice Memorandum, dated August 27, 1991, Reference Stack Height Analysis for Half Crates of Stabilized Waste
- \* Refer to Drawing No 39717-0281, Sheet 1, 2 and 3 of 3 for Pad 904 - Inventory Storage Plan.
- \* Refer to Drawing No D39717-0285, Sheet 1 of 1 for Pad 904 - Inventory Storage Plan for Waste Material Input prior to startup reprocessing.

## COMPUTER SIMULATION

ProModel Computer software was used to simulate the material handling system design to verify that the material handling system design will be able to achieve the EG&G specified 20 tons per hour capacity

Meetings were held with EG&G to determine the functional requirements of the material handling system. These functional requirements included tasks such as labelling, visual inspection, smear test, curing, crate closure and closure inspection. Block diagrams were prepared to illustrate the sequence of operations

ProModel uses statistical techniques to model manufacturing functions. Each function is modeled in time, as a probability distribution function. Many probability distribution functions are available in the ProModel software

Preliminary material handling equipment arrangements drawings with stabilized waste inventory layouts were prepared for Low and High Water Ratio Pond Sludge Processing and Comix with trash removal Pondercrete/Saltcrete Processing. These plans were used to determine travel distances for fork trucks and conveyors. Travel speeds were estimated from manufacturers data. These distances and speeds were used to select the appropriate probability density curves and to estimate times to execute functions

The data obtained was entered into the ProModel computer program to develop the model. The model was then run with the simplest equipment arrangement (that is a single line series of operations) to determine if there were any operational bottlenecks. There were bottlenecks at the visual/smear test inspection stations and the closure stations. The material handling system was then rearranged to provide two inspection stations in parallel and two closure stations in parallel. These changes were sufficient to remove the bottlenecks and to verify that the material handling system can handle the 20 ton per hour production rate

The ProModel program has the ability to generate a great deal of useful data in a multitude of menu driven reports. However, the data is frequently in a form that is not easily deciphered by an individual who is not completely familiar with the ProModel software and its definition of various terms. Brown & Root will be pleased to provide and explain any specific reports that may be of interest to EG&G

The computer model generates the time required for processing the various waste forms which is useful in sequencing the project and for schedule development. A tabulation of the processing time duration based on the quantities listed in Sections 4.1 and 4.2 is listed in Table 5-1. The durations are elapsed days including Sundays. Additional qualifications are included in the notes at the bottom of the table

**TABLE 5-1. TABULATION OF THEORETICAL PROCESSING TIMES  
REQUIRED TO STABILIZE THE VARIOUS SOURCES OF WASTE IN  
CALENDAR DAYS (1)**

**Pond Sludge Processing**

<b><u>SOURCE</u></b>	<b><u>750 PAD LOW WATER RATIO</u></b>	<b><u>750 PAD HIGH WATER RATIO</u></b>
----------------------	---	--

Pond 207A	2 05	
Pond 207B-N	15 10	
Pond 207B-C	15 10	
Pond 207B-S	15 10	
Pond 207C	10 58	
Clarifier Tank	2 84	
<u>Evaporator</u>	<u>6 80</u>	
Total Time for Pond Sludge Processing	<u>37 37</u> (3)	<u>105 99</u> (4)

**Pondcrete/Saltcrete Reprocessing**

**904 PAD  
COMIX WITH TRASH REMOVAL**

Existing Pondcrete	
Tri-walls	30 72
Half Crates	2 36
<u>Metals</u>	<u>12 51</u>
Total Time for Pondcrete	<u>45 59</u>
Existing Saltcrete	
Tri-walls	12 65
Half Crates	8 36
<u>Metals</u>	<u>3 14</u>
Total Time for Saltcrete	<u>24 15</u>
New Waste	
New Saltcrete	7 90
Reprocessed Rejects (from both Pads)	13 91
<u>Reprocessed Lab Samples (from both Pads)</u>	<u>2 08</u>
Total Time for New Waste	<u>23 89</u>
Total Time for Pondcrete/Saltcrete Reprocessing	<u>93 63</u>

**Note**

- (1) These times are theoretical minimums and do not allow for equipment availability, security delays, wind delays, and weather delays. To adjust the above to include these items, the above numbers should be divided by 78 percent
- (2) The above times do not include holidays.
- (3) Includes processing time and storage on 750 Pad
- (4) Includes processing time only. Volumes generated are such that they cannot all be stored on 750 Pad



**MANNING REQUIREMENTS**

The Manning Requirements Spread Sheets on the following two pages represent the current estimate of personnel required for the Lab, 207 Pad, 788 Pad, 750 Pad and 904 Pad. The estimates do not include off pad support personnel for functions such as delivery of empty half crates, smear test supplies, etc. or personnel to transport stabilized waste to new pads that are not physically connected to the existing pads. These numbers are estimated on the current process equipment requirements. Any equipment changes could impact these manning levels significantly, as well as any change to the level of controls and automation.

**FORK TRUCK REQUIREMENTS**

This study assumes that EG&G will continue to use their existing fork trucks, which are described in Exhibits L and M of the Appendix.

- The number of fork trucks required is based on the following mode of operations:

1. The fork trucks will be used to perform the functions as described in this study and will not be used for other tasks
2. The fork trucks used for stabilized waste storage will be operated, recharged, and idled in accordance with the following schedule --

Operation	6 Hours
Battery recharging	8 Hours
<u>Idle time (battery cool down)</u>	<u>8 Hours</u>
Total Fork Truck Operational Cycle	<u>22 Hours</u>

The number of fork trucks required are as follows

750 Pad - Low & High Water Ratio

<u>Work Station</u>	<u>Number of Fork Trucks Per Day</u>
207 Pad Trash Box Removal	1
Casting Fork Truck	1
Storage Fork Trucks	6
<u>Spare Fork Trucks in Reserve</u>	<u>1</u>
Total Number of Fork Trucks	9 (1)

904 Pad Pondcrete Reprocessing - Comix with Trash Separation

<u>Work Station</u>	<u>Number of Fork Trucks Per Day</u>
Waste Input	6
Casting/Trash	2
Storage	6
<u>Spare Reserved</u>	<u>1</u>
Total Number of Fork Trucks	<u>15</u>

Note

- (1) Volumes of waste generated for high water ratio can not all be stored on 750 Pad. Therefore it is not possible to assess the true number of storage fork lifts at this time.

## 9.0 MATERIAL HANDLING STUDY DESIGN BASIS

This section contains design basis that were not necessarily used on the study, but will apply to the detailed design effort. Comments on these basis are requested from EG&G.

### 9.1 Description of Project

Refer to the "Project Plan", Rocky Flats Solar Pond/ Pondercrete Stabilization Project, Rev 8 for a complete description of this project.

### 9.2 Inventory of Waste --

#### 9.2.1 Pond Sludge

		Volume
<u>Pond No.</u>	<u>Waste</u>	<u>(Cubic Yards)</u>
207A	Sludge	4
	Liquid	598
207B-N	Sludge	660
	Liquid	4848
207B-C	Sludge	766
	Liquid	3637
207B-S	Sludge	786
	Liquid	3589
207C	Sludge & Liquid	1873
Reference	1	Weston Solar Pond Sampling Report, July 1991
	2	Exhibit "O" of the Appendix, Table 2 Estimated Quantities from Weston Report Data, dated 23-Aug-91

9 2 2

## Miscellaneous Sources

<u>Source</u>	<u>Waste</u>	<u>Volume (Cubic Yards)</u>
Clarifier (Located at Bldg 788)	Waste/Sludge/Sediment	124
Evaporators (Located at Bldg 910)	Sediment/Sludge/Chemical Salts (Via 55 gallon drums or tank truck)	743

9.2 3

## Existing Pondcrete/Saltcrete

	<u>Pad 750</u>	<u>Pad 904</u>	<u>Total</u>
<u>Pondcrete</u>			
Tri-Walls	3,052	2,754	5,806(1)
Half Crates	0	39	39
Metal Waste	657(1)	118(1)	775
<u>Saltcrete</u>			
Triwalls	782	1,593	2,375(2)
Half Crates	561	0	561
Metal Waste Container	49(2)	96	141

## Notes

## (1) Pondcrete

The 657 metal waste containers on Pad 750 contain 1934 Tri-Walls and the 118 metal waste containers on Pad 904 contain 359 Tri-walls. The total number of Tri-walls in metal waste containers, which contain Pondcrete is 2,293 Tri-walls. The total number of Tri-walls containing Pondcrete is equal to 8,099. The quantity of Tri-walls on the project is fixed. However, the number of metal waste containers increases as the existing Tri-walls deteriorate and are placed in metals.

## (2) Saltcrete

The 49 metal waste containers on Pad 750 contain 110 Tri-walls and the 96 metal waste containers on Pad 904 contain 182 Tri-walls. The total number of Tri-walls containing Saltcrete equal to 2,667.

Reference: Pondcrete/Saltcrete Inventory Weekly Report, dated Week Ending 04/28/91 (Note: Cleanup drums not included)

9 2 4 New Wastes

9 2 4 1 New Saltcrete - The Rocky Flats Plant will continue to manufacture approximately 30 half crates of new saltcrete per month that will require reprocessing at the 904 Pad

9.2.4.2 Reprocessed Rejects - For the purpose of the Material Handling Study the assumption was made to allow for 3% reject of all Pondcrete/Saltcrete and Pond Sludge processed

9.2.4 3 Reprocessed Lab Samples - For the purpose of the Material Handling Study the assumption was made that a complete set of Quality Control samples will be collected from each fifth half crate processed. This number may be changed when the process design is completed and the quality control system formalized. Each complete set of Q.C. samples include a one (1) quart can of stabilized waste and four (4) tapered test cylinder containers (2 inches in diameter x 4 inches long).

9.2.4.4 HNUS Cleanup Fluids - The quantity and type of fluids have not been identified Currently the use of recycled process water is under consideration

### 9 3        Input Design

#### 9.3 1        Pond Sludge

- Pond Sludge is comprised of the contents of Ponds 207-A, 207-B North, 207-B Center, 207-B South and 207-C, plus evaporator bottoms generated during the pond evaporation project, and the water and sludge contents of the clarifier tank located on the 788 Pad

These sources of pond sludge are currently being sampled for characterization. Until such time that these results are available, data from the recent Weston Solar Pond Sampling Report will be used.

### 9.4        Input Design Basis Information for Pad 904

#### 9.4 1        Pondcrete and Saltcrete

Pondcrete and Saltcrete will each be delivered to the process in wrapped Tri-walls, half crates and corrugated metal waste containers. The quantity of each type of container to be processed is listed in Section 4.2.1 of this report.

Corrugated metal waste containers may contain a few inches of free water in the bottom, however some contain dusty materials. Each container will hold one of three leaking or dusty Tri-walls with their wooden pallets.

#### 9 4 2        Tri-walls

Tri-walls will be delivered complete with outer wooden pallet, outer PVC bag, pressure-sensitive adhesive vinyl plastic tape, inner wooden pallet, Tri-wall container, banding, and inner PVC bag.

##### 1)        Outer and Inner Wooden Pallet

The outer and inner wooden pallets are made of a soft wood, such as pine, and are nominally 42 inches x 42 inches square. They look similar to standard ASME MH 1 2 2M-1989 pallets.

The same size wooden pallet was used for both outside and inside wooden pallets. The outside and inside pallets are arranged 90 degrees out of phase.

2) Outer and Inner PVC Bag

Refer to Exhibit H of the Appendix for Rocky Flats Plant Standard No SX-220, "Standard for PVC Liner for Triple Wall Box "

The same size liner was used for both outer and inner PVC liners

3) Pressure-Sensitive Adhesive Vinyl Plastic Tape

Refer to Exhibit F of the Appendix for Rocky Flats Plant Standard SX-122, "Standard for Pressure-Sensitive Adhesive Vinyl Plastic Tape "

The tape used was six inches wide

4) Tri-wall Container

Refer to Exhibit I of the Appendix for Rocky Flats Plant Standard SX-222, "Standard for Triple Wall Body, Outer Cap, and Insert Cap."

Note Tri-walls on this project are actually half box size according to this standard

5) Plastic Banding and Clips

Half inch wide black nylon straps with steel clips were used

9 4 3

Half Crates

Half Crates will be delivered complete with outside metal straps (Not required on all boxes), pressure-sensitive adhesive vinyl plastic tap (to seal inner PVC bag), inner PVC liner, and cardboard liner

1) Outside Metal Straps

1-1/4 inch wide x 0.031 inch thick x heat treated straps with galvanized steel clips were used

2) Half Crate  
(Nominal Size 2'x4'x7')

Refer to Exhibit C of the Appendix for Rocky Flats Plant Std SX-211, "Standard for Flush Panel Plywood Box Assembly and Exhibit C of the Appendix for Rocky Flats Drawing Number D-25883-001, Issue H, Sheet 1 of 2 and Drawing Number D-25883-002, Issue J, Sheet 2 of 2



3) **Pressure-Sensitive Adhesive Vinyl Plastic Tape**

Refer to Exhibit F of the Appendix for Rocky Flats Plant Standard SX-122, "Standard for Pressure-sensitive adhesive Vinyl Plastic Tape."

4) **Inner PVC Bag**

Refer to Exhibit D of the Appendix for Rocky Flats Plant Std No SX-208, "Standard for PVC Liner for Flush Panel Box "

5) **Cardboard Liner**

Refer to Exhibit E of the Appendix for Rocky Flats Plant Std. No SX-208, "Standard for Fiberboard Liner for Metal and Flush Panel Box."

**9 4 4      Metal Waste Containers**

Corrugated Metal Waste Containers will be delivered complete with 1, 2 or 3 Tri-wall assemblies (each in poor condition) generally wet, however, some are dry and dusty)

Refer to Exhibit J of the Appendix for Rocky Flats Plant Standard No SX-231, "Standard for Corrugated Metal Waste Container (Steel Box)", and Exhibit K of the Appendix for Rocky Flats Plant Drawing No D-26383-2, Issue N, Sheet 2 of 4, "Corrugated Metal Waste Container, Assembly No 2 "

**9.5      Common Process Material Design Basis Information**

**9 5 1      Cement**

Portland Cement, Type to be determined by Treatability Study

**9 5.2      Additives**

The use of additives will be determined during the treatability study

**9 5 3      Full Crates and Half Crates**

(Nominal Size 4'x4'x7' = Full Crates)

(Nominal Size 2'x4'x7' = Half Crates)

Refer to Exhibit B of the Appendix for Rocky Flats Plant Std No SX-311, "Standard for Flush Panel Plywood Box Assembly and Exhibit C of the Appendix for Rocky Flats Drawing Number D-25883-001, Issue H, Sheet 1 of 2 and Drawing Number D-25883-002, Issue J, Sheet 2 of 2

- 9 5 4      PVC Bag for Full Crates and Half Crates
- Refer to Exhibit D of the Appendix for Rocky Flats Plant Std No SX-209, "Standard for PVC Liner for Flush Panel Box "
- 9 5 5      Cardboard Liner for Full Crates and Half Crates
- Refer to Exhibit E of the Appendix for Rocky Flats Plant Std SX-208, "Standard for Fiberboard Liner or Metal and Flush Panel Box "
- 9.5 6      Pressure-Sensitive Adhesive Vinyl Plastic Tape (6" Width)
- Refer to Exhibit F of the Appendix for Rocky Flats Plant Std No SX-122, "Standard for Pressure-Sensitive Adhesive Vinyl Plastic Tape "
- 9.5 7      Adhesive for Installing Full and Half Crates
- Polyurethane Vulken Sealant, 1/12 gallon tubes, 1 tube/lid Refer to Exhibit B of the Appendix for Rocky Flats Std No SX-211, "Standard for Flush Panel Plywood Box Assembly" and exhibit C of the Appendix for Rocky Flats Drawing Number D-25883-001, Issue H, Sheet 1 of 2, and Drawing Number D-25883-002, Issue J, Sheet 2 of 2
- 9 5 8      Nails for Installing Lids on Full and Half Crates
- Refer to Exhibit B of the Appendix for Rocky Flats Std No SX-211, "Standard for Flush Panel Plywood Box Assembly" and Exhibit C of the Appendix for Rocky Flats Drawing Number D-25883-001, Issue H, Sheet 1 of 2
- 9 5 9      Container Documentation Paper Work (Provided by EG&G)
- Refer to Exhibit G of the Appendix for Rocky Flats "Certification of LLW" (RF-47237, Rev 12/88), "Pondercrete Box Log Sheet" (RF-47237, Rev 12/88), Plutonium Contaminated Waste, Radioactive LSA (RF-34510, Rev 12/89), Pondercrete Reprocessing Check Sheet, and Waste Certification Checklist for Pondercrete
- 9 5 10      Department of Transportation (DOT) Sample Containers
- Standard one quart paint cans including lids in accordance with DOT 49CFR173

**9 5 11      Halliburton NUS Environmental Corporation (HNUS) Compression Test Containers**

Plastic compression cylinders nominally 2 inches in diameter x 4 inches long  
Cylinders will be tapered so the sample specimen can be easily removed The  
sample that remains following the compression test will be used for the NVO-  
325-2 2 2-D test, EPA Test 9095, and ASTM D 4359-84

**9.5 12      Materials for Cleaning Boxes that Fail Smear Test**

Information to be provided by EG&G

Table of Design Weights for Objects to be Handled

<u>Description of Object</u>	<u>Design Weight (Pounds)</u>
Full Crate with lid (empty)	469
Half Crate with lid (empty)	362
Corrugated Metal Container (empty)	437
Tri-wall with insert and plastic bands (empty)	16
PVC Bag for Full Crate	13
PVC Bag for Half Crate	8
PVC Bag for Tri-wall	8
Cardboard Liner for Full Crate	26
Cardboard Liner for Half Crate	18
DOT Sample Container	To be determined
HINUS Compression Test Container	To be determined
Tri-wall Wooden Pallet	35
Corrugated Metal Container Wooden Pallet	75
Tri-walls Filled with Pondcrete	900 to 1,300
Tri-walls Filled with Saltercrete	1,400 to 1,500
Half Crates Filled with Poured Pondcrete	4,000 to 4,500
Half Crates Filled with Poured	4,000 to 4,500
Full Crates Filled with Trash	4,000 to 4,500
Fork Truck - 4 wheeled - ECS 25 (without load)	9,244
Fork Truck - 3 wheeled - TM 15S (without load)	7,158

9 7        Fork Trucks

9 7 1       Four Wheeled Style

EG&G currently has 15 Clarke Series ECS 25, battery powered, 4 wheel, cushion tired, lift trucks Refer to Exhibit L of the Appendix for data sheets

9 7 2       Three Wheeled Style

EG&G currently has 3 Clarke Series TM 15S, battery powered, 3 wheel, multi-tire, lift trucks, Refer Exhibit M of the Appendix for data sheets .

9 8        Operating Schedule

The Operating Schedule is two shifts per day, 10 manhours per shift, with one hour lost at the beginning and end of each shift resulting in 8 processing hours per shift

Note: EG&G must provide process support 24 hours per day

The process will operate 6 days per week with 7 days per week support from EG&G as required

9 9        Wind Velocity Operating Restrictions (For information Purposes only)

Work outside of the tents must stop when the wind velocity reaches 35 miles per hour The tents must be evacuated when the wind velocity reaches 55 miles per hour

9 10       Clearance Requirements for Safety Limitations

9 10 1       Maintain a minimum of 30 inches away from the tent internal wall (All tents, complete circumference)

9 10 2       Maintain a minimum aisle of 12 feet wide for fork trucks when picking up a Tri-wall from a stack and transporting to a receiving area.

9 10 3       Maintain a minimum clearance of 36 inches in front of circuit breakers, control panels, and fire extinguisher

9 10 4       Maintain a minimum of 36 inches for aisle of egress in front of exits

9.10 5       Step off pad at Permacon is designated by Rad Engineering as a 4'x4' area

Storage Limitations (Based on Exhibit Q)

Low level waste (full crates)	- 3 high
Low level mixed waste (half crates)	- 6 high
Tri-walls	- 3 high
Corrugated metal containers	- 2 high

RCRA criteria prefers stacks to be back to back with 18-24" aisle space for inspection

Silos for cement and additives stored outside are unlimited in size; however, if located on the pads, must meet pad space and foundation limitations.

Silos for cement and additives stored inside tent must not be within 30 inches of the tent wall

Pad 750 - Low level, mixed waste - Maximum permitted volume allowed on pad at one time is 14,000 cubic yards

Pad 904 - Low level, mixed waste - Maximum permitted volume allowed on Pad at one time is 9,950 cubic yards

## 9.12

Limitations Associated with Transfer of Tri-walls from Pad 750 to Pad 904

The truck (Pondcrete Express) can transfer eleven (11) Tri-walls at a time

Time considerations time required for loading half crates, paperwork, backing-up truck, chocking wheels, and time for RPT to smear tires It takes 15 minutes to half an hour to unload truck, including chocking wheels and removing Tri-walls

One hour to transport to Pad 904 when exiting through the Protected Area (PA)

A fork truck will unload the containers off the truck and set them adjacent to the Pad A second fork truck located on the Pad picks up the container and takes it to a staging area on the Pad

9 13      Table of Design Time Allowances for Various Functions

Smear Test - 5 to 20 minutes

Final Inspection - 3 to 5 minutes


It will take 5-15 minutes to wash a corrugated metal container

9.14      Miscellaneous Design Information

Pondcrete and Saltcrete curing rates are assumed to be 48 hours at a temperature of 56 to 60 degrees F.      --

An area must be reserved for the rain water pump/tank truck and man lift outside of the curb at each Pad

The casting operation must take place inside of a secondary containment area. The half crate must be located under an exhaust hood during casting  
Casting can occur outside of a Permacon      Refer to Exhibit N of the Appendix for further details.

<b>Brown &amp; Root U.S.A., Inc.</b>			CONTRACT NO JR-1198
MATERIAL HANDLING STUDY			IDENTIFICATION NO 412-050-G-001-001
APPROVAL DATE			PAGE 1 OF 1

## EXHIBIT A

### GLOSSARY OF PROJECT TERMINOLOGY

**Tri-Walls** - Nickname for triple-wall body corrugated fiber board package. Refer to Exhibit I of the Appendix for Rocky Flats Plant Std. SX-222 for complete details. Tri-walls is the name of the container's manufacturer.

Note: Tri-walls on this project are actually half box size (22" tall) according to the Standard.

**Full Crates** - Nickname for 4' tall x 4' wide x 7' long flush panel plywood box. Refer to Exhibit B of the Appendix for Rocky Flats Plant Std. SX-211, "Standard for Flush Panel Plywood Box Assembly (for Hazardous Materials)" and Exhibit C of the Appendix for Rocky Flats Drawing No. D-25883-001, Issue H, Sheet 1 of 2 and Rocky Flats Drawing No. D-25883-002, Issue J, Sheet 2 of 2.

**Half Crates** - Nickname for 2' tall x 4' wide x 7' long flush panel plywood box. Refer to Exhibit B of the Appendix for Rocky Flats Plant Std. SX-211, "Standard for Flush Panel Plywood Box Assembly (for Hazardous Materials)" and Exhibit C of the Appendix for Rocky Flats Drawing No. D-25883-001, Issue H, Sheet 1 of 2 and Rocky Flats Drawing No. D-25883-002, Issue J, Sheet 2 of 2.

**PVC Bags** - Nickname for PVC liners used in various types of containers.

**Cardboard Liner** - Nickname for fiberboard liners used in various types of containers.

412-050-G-001-001



Rocky Flats Plant  
P O Box 464  
Golden Colorado 80401

STANDARD FOR  
FLUSH PANEL PLYWOOD  
BOX ASSEMBLY  
(For Hazardous Materials)

I	Revised per SRF SX-211-11	FQE	2/13/81	2/13/81	2/13/81	2/13/81	2/13/81	2/13/81	2/13/81
H	Rev Per DCR SX-211-10		2/13/81	2/13/81	2/13/81	2/13/81	2/13/81	2/13/81	2/13/81
G	REVISED INSPECTION FORM PER DCR-8		6/3/87	6/3/87	6/3/87	6/3/87	6/3/87	6/3/87	6/3/87
F	Rev Per DCR-X-211-7		2/13/81	2/13/81	2/13/81	2/13/81	2/13/81	2/13/81	2/13/81
E	Removes Stock Number Per DCR X-211-5		11/20/81	11/20/81	11/20/81	11/20/81	11/20/81	11/20/81	11/20/81
D	REV "D" Dwgs D25883-1-2		4/7/81	4/7/81	4/7/81	4/7/81	4/7/81	4/7/81	4/7/81
C	REV "C" D25883-2		2/13/81	2/13/81	2/13/81	2/13/81	2/13/81	2/13/81	2/13/81
B	TITLE & GENERAL CHGS		11/21/77	11/21/77	11/21/77	11/21/77	11/21/77	11/21/77	11/21/77
A	ORIGINAL ISSUE		5/9/77	5/9/77	5/9/77	5/9/77	5/9/77	5/9/77	5/9/77
ISSUE	DESCRIPTION	TREC POE	WC&P	HS&E	DATE	BY	APPR D	CLASS	REVIEW
									DESIGN ENGRG DEPT

Revision to this standard shall be accomplished by Design Engineering Waste Process and Development Engineering  
Section and approved by Traffic, Procur. Qual Engineering, Waste Compliance & Planning  
Health Safety & Environmental  
Facilities Quality Engineering

ROCKY FLATS PLANT STD NO. SX-211

STANDARD  
FOR  
FLUSH PANEL PLYWOOD  
BOX ASSEMBLY

1 SCOPE

This Standard defines the requirements for the construction, identification, shipping, workmanship, and quality of Flush Panel Plywood Boxes

2 GENERAL

The provisions of this Standard are not intended to prevent the use of alternates or modifications to the standard in individual cases where such alternates or modifications are obviously required to obtain the results desired. Such alternates or modifications must be approved, in writing, by the Buyer.

3 QUALITY ASSURANCE

3.1 The Buyer will prequalify and select qualified Sellers based on evaluation of capability to perform in accordance with the requirements of this Standard. Failure to meet the requirements shall be cause for disqualification.

3.2 The Seller shall prepare a documented quality assurance program, based on the requirements of this Standard, which shall be planned, implemented and maintained by the Seller.

4 INSPECTION AND TESTING

Seller shall be responsible for all tests necessary to ensure that the finished products meet all requirements of this Standard.

5 APPLICABLE DOCUMENTS

- |  |                        |
|--|------------------------|
| 5.1 Rocky Flats Plant Drawings   | D-25883-1<br>D-25883-2 |
| 5.2 US Products Standard For Construction<br>& Industrial Plywood              | PS 1-83                |
| 5.3 WWP Lumber Grading Rules   |                        |
| 5.4 APA Semi Structural Adhesive   | AFG-01                 |
| 5.5 ASTM D3359 Standard Test Method for<br>Measuring Adhesion by the Tape Test |                        |

## 8 NAILING AND/OR STAPLING

8 1 Additional nails, not to exceed 10d in size, may be used to reduce gaps. Nails or staples which protrude through the material shall be clinched flush or below the surface. Nailing or stapling shall be staggered a minimum of 1/2-inch each side of framing member center line. Nail heads shall be set flush to 1/8-inch maximum below the surface.

8 2 Staples shall be set across the grain of the first ply at not less than a 40 degree angle. A minimum of 25% more staples than nails shall be required if staples are used.

## 9 ADHESIVE/GLUE

9 1 Semi Structural Adhesive shall be applied in a continuous bead of 1/4-inch minimum diameter to all plywood joining edges.

9 2 Glue shall cover at least 80% of interfacing surfaces between framing members and plywood.

## 10 PAINTING

10 1 Gaps between 2" x 12" stringers on the bottom of the boxes shall be filled with caulk as required by the Buyer.

10 2 All exterior surfaces shall be painted, as required by the Buyer, in accordance with the paint manufacturer's application instructions to obtain the required thickness and adhesion so as to achieve an Underwriter's Laboratories, Inc. Class A fire rating.

## 11 IDENTIFICATION

11 1 The top left corners of both ends of the box shall be legibly stenciled with the following information in a minimum of 3/4-inch characters, using a weatherproof ink or black spray paint:

Mfg. Name and/or Symbol  
Serial No.  
Date of Manufacture

The serial number for the 2' x 4' x 7' box shall be preceded by the letter "H", and the serial number for the 4' x 4' x 7' box shall be preceded by the letter "S".

## 12 SHIPPING AND INSPECTION

12 1 Boxes shall be handled and shipped using good commercial methods to ensure damage-free delivery. Temporarily secure lids with 6-penny double-headed nails to resist blowing off in high winds during storage or transportation.

EXHIBIT "A"  
SX-211  
INSPECTION FORM

REV NO	SPECIFICATION	INSPECTION IDENTITY	DRAWING NUMBER D-25883-1-2	PURCHASE ORDER NO
1	Quantity in lot		RIPS NO	
2	Identification Markings Legibly Stenciled in Black Mfg/Name or Symbol Serial No w/Prefix (H-2X4X7) or (S-4X4X7) Date of Mfg		<div>DIMENSIONAL INSPECTION</div> <div>INSPECTED BY   DATE INSPECTED   SHIFT</div> <div>ACCEPT   REJECT   BY   DATE</div>	
3	Panel Size Tolerance $\pm 1/8"$ Bottom 46-1/2" X 82-1/2" Top 48" X 84" Ends 46-1/2" X 48" (24)* Sides 84" X 48" (24)		<div>RADIOGRAPHIC INSPECTION</div> <div>ACCEPT   REJECT   BY   DATE</div> <div>MATERIAL CERTIFICATION</div> <div>ACCEPT   REJECT   BY   DATE</div>	
4	Framing member location on side panel Tolerance $\pm 1/8"$ Vertical Outside: 3/4" From Struts Plywood edge Each End. Inside 27" From Plywood edge to edge of strut  Horizontal ---Flush with edge Strut		<div>OVERALL ACCEPTANCE</div> <div>ACCEPT   REJECT   BY   DATE</div> <div>ILLUSTRATION (*Applicable Size)</div>	
5	Fastener Pattern Maximum of 20 fasteners may deviate from 1/2" off-set of center line of struts each box			
6	Fasteners Maximum 2 missing each strut. Total of 10 per box			
7	Interior Framing member gaps Maximum 1/16" extending more than 1" in depth.			
8	Seam & laminate gaps extending to box interior acceptable if filled with adhesive		<div>REV   DESCRIPTION   DATE</div> <div>APPROVALS   TITLE</div> <div>DATE   TOTAL SHEET   SIZE   DRAWING NUMBER</div> <div>NUMBER   SHEET   ISSUE</div>	

EXHIBIT "A"  
SX-211  
INSPECTION FORM

ITEM NO	SPECIFICATION	INSPECTION ENTRY	DRAWING NUMBER D-25883-1-2	PURCHASE ORDER NO																								
16	Paint (when required) shall be applied to prevent visual detection of substrate on all exterior surfaces		RPS NO																									
17	Paint (when required) shall be applied as per paint manufacturer's application instruction to meet the minimum mil thickness required for an Underwriter's Laboratory Class A fire retardancy. (See Certification)		<div style="text-align: center;">DIMENSIONAL INSPECTION</div> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td>INSPECTED BY</td> <td>DATE INSPECTED</td> <td>SHIFT</td> </tr> <tr> <td>ACCEPT</td> <td>REJECT</td> <td>BY</td> </tr> <tr> <td colspan="3" style="text-align: center;">RADIOGRAPHIC INSPECTION</td> </tr> <tr> <td>ACCEPT</td> <td>REJECT</td> <td>BY</td> </tr> <tr> <td colspan="3" style="text-align: center;">MATERIAL CERTIFICATION</td> </tr> <tr> <td>ACCEPT</td> <td>REJECT</td> <td>BY</td> </tr> <tr> <td colspan="3" style="text-align: center;">OVERALL ACCEPTANCE</td> </tr> <tr> <td>ACCEPT</td> <td>REJECT</td> <td>BY</td> </tr> </table>		INSPECTED BY	DATE INSPECTED	SHIFT	ACCEPT	REJECT	BY	RADIOGRAPHIC INSPECTION			ACCEPT	REJECT	BY	MATERIAL CERTIFICATION			ACCEPT	REJECT	BY	OVERALL ACCEPTANCE			ACCEPT	REJECT	BY
INSPECTED BY	DATE INSPECTED	SHIFT																										
ACCEPT	REJECT	BY																										
RADIOGRAPHIC INSPECTION																												
ACCEPT	REJECT	BY																										
MATERIAL CERTIFICATION																												
ACCEPT	REJECT	BY																										
OVERALL ACCEPTANCE																												
ACCEPT	REJECT	BY																										
18	Paint (when required) shall have a Tape Test adhesion of 5A using Method A per ASTM D-3359-87.		<div style="text-align: center;">ILLUSTRATION</div> <div style="height: 200px; border: 1px solid black;"></div>																									
			<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td>REV</td> <td>DESCRIPTION</td> <td>DATE</td> </tr> <tr> <td>APPROVALS</td> <td colspan="2">TITLE</td> </tr> <tr> <td>DATE</td> <td>TOTAL SHEET</td> <td>SIZE</td> </tr> <tr> <td colspan="2"></td> <td>DRAWING NUMBER</td> </tr> <tr> <td></td> <td></td> <td>NUMBER   SHEET   ISSUE</td> </tr> </table>		REV	DESCRIPTION	DATE	APPROVALS	TITLE		DATE	TOTAL SHEET	SIZE			DRAWING NUMBER			NUMBER   SHEET   ISSUE									
REV	DESCRIPTION	DATE																										
APPROVALS	TITLE																											
DATE	TOTAL SHEET	SIZE																										
		DRAWING NUMBER																										
		NUMBER   SHEET   ISSUE																										



# Rockwell International

Atomics International Division  
Rocky Flats Plant  
P O Box 484  
Golden Colorado 80401

## STANDARD FOR PVC LINER FOR FLUSH PANEL BOX

D	Rev. Per DCR SX-209-02	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	4-19-81	4/12/80	LE	<i>[Signature]</i>	<i>[Signature]</i>
C	Added Table One, Revised Fig. One and Para 2.6 per DCR-X-209-2	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	7/20/82	J.N. Case	<i>[Signature]</i>	<i>[Signature]</i>
B	Add Warehouse No. 77-14-05	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	4/14/80	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>
A	ORIGINAL ISSUE	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	8/9/77	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>
ISSUE	DESCRIPTION	Traffic POE	WO	HS&E	DATE	BY	APPR'D	CLASS	REVIEW
DESIGN ENGRG. DEPT									

Revision to this standard shall be accomplished by Design Engineering Waste Compliance and Planning

Section and approved by Traffic  
Procurement Quality Engineering  
Waste Operations  
Health, Safety and Environment

ROCKY FLATS PLANT STD

NO. SX-209

STANDARD  
FOR  
PVC LINER FOR  
FLUSH PANEL BOX

1 SCOPE

This Standard defines the minimum requirements for a PVC liner for either metal or plywood waste boxes

2 GENERAL

The provisions of this Standard are not intended to prevent the use of alternates or modifications to the standard in individual cases where such alternates or modifications are obviously required to obtain the results desired. Such alternates or modifications shall be approved, in writing, by the Buyer.

3 QUALITY ASSURANCE

3.1 The Buyer will prequalify and select qualified Sellers based on evaluation of capability to perform in accordance with the requirements of this Standard. Failure to meet the requirements shall be cause for disqualification.

3.2 The Seller shall prepare a documented quality assurance program, based on the requirements of this Standard, which shall be planned, implemented and maintained by the Seller.

4. INSPECTION AND TESTING

Seller shall be responsible for all tests necessary to ensure the finished products meet all requirements of this Standard.

5. APPLICABLE DOCUMENTS

5.1 The following Codes, Standards, and Specifications apply to this Standard to the extent indicated by the Purchase Order, Drawings or related documents. The latest edition, addenda or revision shall apply.

5.1.1 Military Standards - Mil Spec. MIL-L-10547

5.1.2 Rocky Flats Drawing - Dwg No. 38819-001

6. MATERIAL

6.1 Material shall be plasticized polyvinyl chloride (PVC) sheet, translucent, matte finish, 2,200 psi minimum tensile strength, 0.011-inch minimum thickness. Cold flexibility in accordance with Paragraph 3.6.3 and 4.4.3 of Military Specification MIL-L-10547 shall be required.

6.2 The liner's inside dimensions shall comply with the requirements of Table I and Drawing Number 38819-001. Variation in form such as squareness, perpendicularity and radius shall fall within the specified limits.

6.3 Each liner when set up shall have a square rectangular bottom with top flaps as shown in Figure 1, or a square rectangular bottom and 34-inch end radius with top flaps as shown in Figure 2 of Drawing 38819-001. Location of seams shall be optional. Heat-sealed seams shall be 3/8-inch  $\pm$  1/8-inch minimum with a tensile strength of 1,000 psi minimum. Heat-seal seams may not be interrupted with gaps.

6.4 Each finished liner assembly shall be free of visible air leaks, as determined by submerging the inflated liner in water, or by a visual inspection of the material and seams. If the supplier has obtained written approval from the Buyer other means of leak testing may be used; such as placing a medium colored cloth under a single layer of PVC material then applying alcohol to the surface of questionable areas and observing the cloth for any migration of the alcohol.

6.5 Each liner shall be uniformly constructed and free from foreign material, imbedded particles, pin holes, tears, blisters, sharp creases, or other imperfections which might impair its function.

## 7. IDENTIFICATION

Each liner shall be durably and legibly ink-stamped with the standard number, assembly number, date of manufacture, and manufacturer's identification on one of the side flaps. The manufacturer has the option of embossing the same information in one of the side seams within 6-inches of the top of the liner.

Example    SX-209  
             Assembly Number  
             Date  
             Manufacturer's Name

## 8. INSPECTION

Refer to Exhibits "A" through "F" for the proper inspection form for each of the various liners (sizes one through five) plus the Trupact II liner.

## 9. ACCEPTANCE

9.1 The Buyer's acceptance will be based on visual, dimensional, and functional inspection and laboratory tests on a representative sample from each lot of liners supplied.

9.2 Acceptance will be based on compliance with Buyer's sampling plan. Failure to comply on any single characteristic may result in the rejection of the entire shipment.



10 PACKAGING AND SHIPPING

Good commercial packaging methods shall be used to ensure damage free delivery of liners. The identification required in Section 7, current purchase order number, and number of liners per box shall be marked on the outside of each box of liners

END OF STANDARD TEXT

EXHIBIT "A"  
PVC BOX LINER SIZE ONE  
INSPECTION FORM

ITEM NO	SPECIFICATION	INSPECTION ENTRY	DRAWING NUMBER 38819-001	PURCHASE ORDER NO
1	QUANTITY IN LOT		RIRS NO	
2	IDENTIFICATION INFORMATION Record Identification: SX-209 Size One Date of Manufacture Manufacturer's Identification			
3	PVC MATERIAL (See Certification)		DIMENSIONAL INSPECTION	
4	MATERIAL THICKNESS (0.011-inch Min)		INSPECTED BY	DATE INSPECTED   SHIFT
5	TENSILE STRENGTH (2200 psi Min)		ACCEPT   REJECT   BY	DATE
6	LENGTH OF LINER (87-inch + or - 1/2-inch)		RADIOGRAPHIC INSPECTION	
7	WIDTH OF LINER (52-inch + or - 1/2-inch)		ACCEPT   REJECT   BY	DATE
8	HEIGHT OF LINER (53-inch + or - 1/2-inch)		MATERIAL CERTIFICATION	
9	WIDTH OF SIDE FLAP (30-inch Min)		ACCEPT   REJECT   BY	DATE
10	WIDTH OF END FLAP (20-inch Min)		OVERALL ACCEPTANCE	
11	SEAM STRENGTH (1000 psi Min)		ACCEPT   REJECT   BY	DATE
12	COLD FLEXIBILITY TEST (Satisfactory)		ILLUSTRATION	
13	VISUAL LEAK CHECK (Satisfactory)			
			REV.	DESCRIPTION   DATE
			APPROVALS	TITLE
			DATE	TOTAL SHEETS   SIZE   DRAWING NUMBER
				NUMBER   SHEETS   ISSUE

EXHIBIT "B"  
PVC BOX LINER SIZE TWO  
INSPECTION FORM

ITEM NO	SPECIFICATION	INSPECTION ENTRY	DRAWING NUMBER 38819-001	DWG-CASE ORDER NO															
1	QUANTITY IN LOT		<div style="border: 1px solid black; padding: 5px;">           RIRS NO             DIMENSIONAL INSPECTION            INSPECTED BY    DATE INSPECTED    SHIFT            ACCEPT    REJECT    BY    DATE         </div>																
2	IDENTIFICATION INFORMATION Record Identification: SX-209 Size Two Date of Manufacture Manufacturer's Identification																		
3	PVC MATERIAL (See Certification)																		
4	MATERIAL THICKNESS (0.011-inch Min)																		
5	TENSILE STRENGTH (2200 psi Min)		<div style="border: 1px solid black; padding: 5px;">           RADIOGRAPHIC INSPECTION            ACCEPT    REJECT    BY    DATE         </div>																
6	LENGTH OF LINER (83 5-inch + or - 1/2-Inch)		<div style="border: 1px solid black; padding: 5px;">           MATERIAL CERTIFICATION            ACCEPT    REJECT    BY    DATE         </div>																
7	WIDTH OF LINER (46-inch + or - 1/2-inch)		<div style="border: 1px solid black; padding: 5px;">           OVERALL ACCEPTANCE            ACCEPT    REJECT    BY    DATE             ILLUSTRATION         </div>																
8	HEIGHT OF LINER (47-inch + or - 1/2-inch)																		
9	WIDTH OF SIDE FLAP (30-inch Min)																		
10	WIDTH OF END FLAP (20-inch Min.)																		
11	SEAM STRENGTH (1000 psi Min)																		
12	COLD FLEXIBILITY TEST (Satisfactory)																		
13	VISUAL LEAK CHECK (Satisfactory)																		
			<div style="border: 1px solid black; padding: 5px;"> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">REV</td> <td style="width: 55%;">DESCRIPTION</td> <td style="width: 30%;">DATE</td> </tr> <tr> <td colspan="3">APPROVALS    TITLE</td> </tr> <tr> <td>DATE</td> <td>TOTAL SHEET</td> <td>SIZE</td> </tr> <tr> <td colspan="3">DRAWING NUMBER</td> </tr> <tr> <td>NUMBER</td> <td>SHEET</td> <td>ISSUE</td> </tr> </table> </div>		REV	DESCRIPTION	DATE	APPROVALS    TITLE			DATE	TOTAL SHEET	SIZE	DRAWING NUMBER			NUMBER	SHEET	ISSUE
REV	DESCRIPTION	DATE																	
APPROVALS    TITLE																			
DATE	TOTAL SHEET	SIZE																	
DRAWING NUMBER																			
NUMBER	SHEET	ISSUE																	

EXHIBIT "C"  
PVC BOX LINER SIZE THREE  
INSPECTION FORM

ITEM NO	SPECIFICATION	INSPECTION ENTRY	DRAWING NUMBER 38819-001	PURCHASE ORDER NO																		
1	QUANTITY IN LOT		RIRS NO																			
2	IDENTIFICATION INFORMATION Record Identification- SX-209 Size Three Date of Manufacture Manufacturer's Identification		<div style="text-align: center;">DIMENSIONAL INSPECTION</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">INSPECTED BY</td> <td style="width: 33%;">DATE INSPECTED</td> <td style="width: 34%;">SHIFT</td> </tr> <tr> <td>ACCEPT</td> <td>REJECT</td> <td>BY</td> </tr> <tr> <td></td> <td></td> <td>DATE</td> </tr> </table>		INSPECTED BY	DATE INSPECTED	SHIFT	ACCEPT	REJECT	BY			DATE									
INSPECTED BY	DATE INSPECTED	SHIFT																				
ACCEPT	REJECT	BY																				
		DATE																				
3	PVC MATERIAL (See Certification)		<div style="text-align: center;">RADIOGRAPHIC INSPECTION</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">ACCEPT</td> <td style="width: 33%;">REJECT</td> <td style="width: 34%;">BY</td> </tr> <tr> <td></td> <td></td> <td>DATE</td> </tr> </table>		ACCEPT	REJECT	BY			DATE												
ACCEPT	REJECT	BY																				
		DATE																				
4	MATERIAL THICKNESS (0.011-inch Min)		<div style="text-align: center;">MATERIAL CERTIFICATION</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">ACCEPT</td> <td style="width: 33%;">REJECT</td> <td style="width: 34%;">BY</td> </tr> <tr> <td></td> <td></td> <td>DATE</td> </tr> </table>		ACCEPT	REJECT	BY			DATE												
ACCEPT	REJECT	BY																				
		DATE																				
5	TENSILE STRENGTH (2200 psi Min)		<div style="text-align: center;">OVERALL ACCEPTANCE</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">ACCEPT</td> <td style="width: 33%;">REJECT</td> <td style="width: 34%;">BY</td> </tr> <tr> <td></td> <td></td> <td>DATE</td> </tr> </table>		ACCEPT	REJECT	BY			DATE												
ACCEPT	REJECT	BY																				
		DATE																				
6	LENGTH OF LINER (73.5-inch + or - 1/2-inch)		ILLUSTRATION																			
7	WIDTH OF LINER (48-inch + or - 1/2-inch)																					
8	HEIGHT OF LINER (37.5-inch + or - 1/2-inch)																					
9	WIDTH OF SIDE FLAP (30-inch Min)																					
10	WIDTH OF END FLAP (20-inch Min)																					
11	SEAM STRENGTH (1000 psi Min.)																					
12	COLD FLEXIBILITY TEST (Satisfactory)																					
13	VISUAL LEAK CHECK (Satisfactory)																					
			<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">REV</td> <td style="width: 60%;">DESCRIPTION</td> <td style="width: 30%;">DATE</td> </tr> <tr> <td colspan="3">APPROVALS</td> </tr> <tr> <td colspan="3">TITLE</td> </tr> <tr> <td>DATE</td> <td>TOTAL SHEET</td> <td>SIZE</td> </tr> <tr> <td colspan="3">DRAWING NUMBER</td> </tr> <tr> <td>NUMBER</td> <td>SHEET</td> <td>ISSUE</td> </tr> </table>		REV	DESCRIPTION	DATE	APPROVALS			TITLE			DATE	TOTAL SHEET	SIZE	DRAWING NUMBER			NUMBER	SHEET	ISSUE
REV	DESCRIPTION	DATE																				
APPROVALS																						
TITLE																						
DATE	TOTAL SHEET	SIZE																				
DRAWING NUMBER																						
NUMBER	SHEET	ISSUE																				

EXHIBIT "D"  
PVC BOX LINER SIZE FOUR  
INSPECTION FORM

ITEM NO	SPECIFICATION	INSPECTION ENTRY	DRAWING NUMBER 38819-001	PURCHASE ORDER NO
1	QUANTITY IN LOT		RIRS NO	
2	IDENTIFICATION INFORMATION Record Identification SX-209 Size Four Date of Manufacture Manufacturer's Identification			
			DIMENSIONAL INSPECTION	
			INSPECTED BY	DATE INSPECTED
			ACCEPT	REJECT
			BY	DATE
3	PVC MATERIAL (See Certification)		RADIOGRAPHIC INSPECTION	
			ACCEPT	REJECT
			BY	DATE
4	MATERIAL THICKNESS (0.011-inch Min)		MATERIAL CERTIFICATION	
			ACCEPT	REJECT
			BY	DATE
5	TENSILE STRENGTH (2200 psi Min)		OVERALL ACCEPTANCE	
			ACCEPT	REJECT
			BY	DATE
6	LENGTH OF LINER (67-inch + or - 1/2-inch)		ILLUSTRATION	
7	WIDTH OF LINER (52-inch + or - 1/2-inch)			
8	HEIGHT OF LINER (37.5-inch + or - 1/2-inch)			
9	WIDTH OF SIDE FLAP (30-inch Min)			
10	WIDTH OF END FLAP (20-inch Min.)			
11	SEAM STRENGTH (1000 psi Min)			
12	COLD FLEXIBILITY TEST (Satisfactory)			
13	VISUAL LEAK CHECK (Satisfactory)			
			REV	DESCRIPTION
			DATE	TITLE
			DATE	TOTAL SHEET
			SIZE	DRAWING NUMBER
			NUMBER	SHEET
			ISSUE	

EXHIBIT "E"  
PVC BOX LINER SIZE FIVE  
INSPECTION FORM

ITEM NO	SPECIFICATION	INSPECTION ENTRY	DRAWING NUMBER 38819-001	PURCHASE ORDER NO
1	QUANTITY IN LOT		RIRS NO	
2	IDENTIFICATION INFORMATION Record Identification: SX-209 Size Five Date of Manufacture Manufacturer's Identification		DIMENSIONAL INSPECTION INSPECTED BY      DATE INSPECTED      SHIFT ACCEPT      REJECT      BY      DATE	
3	PVC MATERIAL (See Certification)		RADIOGRAPHIC INSPECTION ACCEPT      REJECT      BY      DATE	
4	MATERIAL THICKNESS (0.011-inch Min.)		MATERIAL CERTIFICATION ACCEPT      REJECT      BY      DATE	
5	TENSILE STRENGTH (2200 psi Min.)		OVERALL ACCEPTANCE ACCEPT      REJECT      BY      DATE	
6	LENGTH OF LINER (83-inch + or - 1/2-inch)		ILLUSTRATION	
7	WIDTH OF LINER (46-inch + or - 1/2-inch)			
8	HEIGHT OF LINER (23.0-inch + or - 1/2-inch)			
9	WIDTH OF SIDE FLAP (30-inch Min.)			
10	WIDTH OF END FLAP (20-inch Min.)			
11	SEAM STRENGTH (1000 psi Min.)			
12	COLD FLEXIBILITY TEST (Satisfactory)			
13	VISUAL LEAK CHECK (Satisfactory)			
			REV      DESCRIPTION      DATE APPROVALS      TITLE DATE      TOTAL SHEET      SIZE      DRAWING NUMBER NUMBER      SHEET      ISSUE	

EXHIBIT "F"  
PVC BOX LINER TRUPACT II  
INSPECTION FORM

ITEM NO	SPECIFICATION	INSPECTION ENTRY	DRAWING NUMBER 38819-001	PURCHASE ORDER NO																		
1	QUANTITY IN LOT		RIRS NO																			
2	IDENTIFICATION INFORMATION Record Identification SX-209 Trupact II Date of Manufacture Manufacturer's Identification		<div style="text-align: center;">DIMENSIONAL INSPECTION</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">INSPECTED BY</td> <td style="width: 33%;">DATE INSPECTED</td> <td style="width: 34%;">SHIFT</td> </tr> <tr> <td>ACCEPT</td> <td>REJECT</td> <td>BY</td> </tr> <tr> <td></td> <td></td> <td>DATE</td> </tr> </table>		INSPECTED BY	DATE INSPECTED	SHIFT	ACCEPT	REJECT	BY			DATE									
INSPECTED BY	DATE INSPECTED	SHIFT																				
ACCEPT	REJECT	BY																				
		DATE																				
3	PVC MATERIAL (See Certification)		<div style="text-align: center;">RADIOGRAPHIC INSPECTION</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">ACCEPT</td> <td style="width: 33%;">REJECT</td> <td style="width: 34%;">BY</td> </tr> <tr> <td></td> <td></td> <td>DATE</td> </tr> </table>		ACCEPT	REJECT	BY			DATE												
ACCEPT	REJECT	BY																				
		DATE																				
4	MATERIAL THICKNESS (0.011-inch Min)		<div style="text-align: center;">MATERIAL CERTIFICATION</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">ACCEPT</td> <td style="width: 33%;">REJECT</td> <td style="width: 34%;">BY</td> </tr> <tr> <td></td> <td></td> <td>DATE</td> </tr> </table>		ACCEPT	REJECT	BY			DATE												
ACCEPT	REJECT	BY																				
		DATE																				
5	TENSILE STRENGTH (2200 psi Min)		<div style="text-align: center;">OVERALL ACCEPTANCE</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">ACCEPT</td> <td style="width: 33%;">REJECT</td> <td style="width: 34%;">BY</td> </tr> <tr> <td></td> <td></td> <td>DATE</td> </tr> </table>		ACCEPT	REJECT	BY			DATE												
ACCEPT	REJECT	BY																				
		DATE																				
6	LENGTH OF LINER STRAIGHT SIDE (45-inch + or - 1/2-inch)		<div style="text-align: center;">ILLUSTRATION</div> <div style="height: 200px; border: 1px solid black;"></div>																			
7	WIDTH OF LINER (52-inch + or - 1/2-inch)																					
8	HEIGHT OF LINER (36-inch + or - 1/2-inch)																					
9	RADIUS OF LINER ENDS (34-inch Min)																					
10	WIDTH OF END FLAPS (30-inch Min)																					
11	SEAM STRENGTH (1000 psi Min)																					
12	COLD FLEXIBILITY TEST (Satisfactory)																					
13	VISUAL LEAK CHECK (Satisfactory)																					
			<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">REV</td> <td style="width: 60%;">DESCRIPTION</td> <td style="width: 30%;">DATE</td> </tr> <tr> <td colspan="3">APPROVALS</td> </tr> <tr> <td colspan="3">TITLE</td> </tr> <tr> <td>DATE</td> <td>TOTAL SHEET</td> <td>SIZE</td> </tr> <tr> <td colspan="3">DRAWING NUMBER</td> </tr> <tr> <td colspan="3">NUMBER   SHEET   ISSUE</td> </tr> </table>		REV	DESCRIPTION	DATE	APPROVALS			TITLE			DATE	TOTAL SHEET	SIZE	DRAWING NUMBER			NUMBER   SHEET   ISSUE		
REV	DESCRIPTION	DATE																				
APPROVALS																						
TITLE																						
DATE	TOTAL SHEET	SIZE																				
DRAWING NUMBER																						
NUMBER   SHEET   ISSUE																						

134

of the



**FIGURE 2**



**FIGURE 1**

ROCKY FLATS PLANT SITE/BOARD NO 3X-209 ATTACHMENT

**RETAIN**

COMPTON'S

[illegible]





# Rockwell International

Atomics International Division  
Rocky Flats Plant  
P O Box 484  
Golden Colorado 80401

## STANDARD FOR FIBERBOARD LINER FOR METAL AND FLUSH PANEL BOX

D	Rev. Per DCR SX-208-03	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	4-18-77	4/21/77	<i>[Signature]</i>	<i>[Signature]</i>	S.D. SICK
C	CHG TITLE, SEC 2 & 3 ADDED INSPEC FORM PER DCR-Y 208-2	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	RET	8/13/82	JNC	<i>[Signature]</i>	<i>[Signature]</i>
B	Add Stk No. for Half Liner	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	2-13-78	FWC	<i>[Signature]</i>	<i>[Signature]</i>
A	ORIGINAL ISSUE	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	8/9/77	FWC	<i>[Signature]</i>	<i>[Signature]</i>
ISSUE	DESCRIPTION	TREC	POE	WO	HS&E	DATE	BY	APPROD	CLASS REVIEW
DESIGN ENGRG. DEPT									

Revision to this standard shall be accomplished by Design Engineering Waste Compliance and Planning  
Section and approved by \_\_\_\_\_

Traffic  
Procurement Quality Engineering  
Waste Operations  
Health, Safety and Environment

ROCKY FLATS PLANT STD

NO. SX-208

STANDARD  
FOR  
FIBERBOARD LINER FOR  
METAL AND FLUSH PANEL BOX

1 SCOPE

This Standard defines the minimum requirements for three piece fiberboard liner for the metal and flush panel boxes.

2 GENERAL

The provisions of this Standard are not intended to prevent the use of alternates or modifications to the standard in individual cases where such alternates or modifications are obviously required to obtain the results desired. Such alternates or modifications shall be approved, in writing, by the Buyer.

3 QUALITY ASSURANCE

3.1 The Buyer will prequalify and select qualified Sellers based on evaluation of capability to perform in accordance with the requirements of this Standard. Failure to meet the requirements shall be cause for disqualification.

3.2 The Seller shall prepare a documented quality assurance program, based on the requirements of this Standard, which shall be planned, implemented and maintained by the Seller.

4. INSPECTION AND TESTING

Seller shall be responsible for all tests necessary to ensure that the finished products meet all requirements of this Standard.

5. APPLICABLE DOCUMENTS

5.1 The following Codes, Standards and Specifications apply to this Standard to the extent indicated by the Purchase Order, Drawings or related documents. The latest edition, addenda or revision shall apply.

5.1.1 Fed Spec - PPP-B-636 Boxes, Shipping, Fiberboard.

5.1.2 Rocky Flats Plant Drawing - Drawing No. 38812-001.

6. MATERIAL

6.1 Fiberboard sheet per Federal Specification PPP-B-636, exempt from Paragraph 3.2, 3.3, and 5. Classification shall be as follows.

6.1.1 Style DBLCC (Double Cover Container) modified, see Figure 1 or Figure 2 of Drawing No. 38812-001

6 1 2 Type SF (Solid Fiberboard)  
Class Domestic

6 1 3 Grade 125 pounds per square inch (psi) minimum burst strength

6 1 4 Material thickness 0 051 inch minimum.

## 7 DIMENSIONS

7 1 Refer to Table one and Figure one for dimensional requirements for the five sizes of rectangular liners and Figure two for dimensional requirements for the Trupact II liner on Drawing No 38812-001

7 2 Refer to Exhibits A through F for the Inspection forms covering these six liners

## 8 IDENTIFICATION

The standard number, assembly number, date of manufacture, and manufacturers name shall be ink-stamped on each body tube and on each cover in characters approximately 1/2-inch high

Example: SX-208  
Assembly one  
Date manufactured  
Supplier's name

## 9. PACKAGING AND SHIPPING

Good commercial packaging methods shall be used to ensure damage-free delivery of liners. Bodies and covers shall be packed knocked-down flat, in bundles not to exceed 7-1/2-feet in length, (an extra fold is permissible in the ends of body tube) Bundles shall be palletized in units of 1,000 lb or less

## 10 ACCEPTANCE

The Buyers acceptance will be based on visual, dimensional, and functional inspection of liners supplied.

END OF STANDARD

EXHIBIT "A"  
FIBERBOARD LINER  
SIZE ONE  
INSPECTION FORM

ITEM NO	SPECIFICATION	INSPECTION ENTRY	DRAWING NUMBER 38812-001	PUPC-ASE ORDER NO P.O. #
1	QUANTITY IN LOT		RIRS NO RIRS #	
2	IDENTIFICATION INFORMATION Record Identification SX-208 Size One Date Manufactured Manufacturer's Identification		<div style="text-align: center;">DIMENSIONAL INSPECTION</div> <div style="display: flex; justify-content: space-between;"> <div>INSPECTED BY</div> <div>DATE INSPECTED</div> <div>SHIFT</div> </div> <div style="display: flex; justify-content: space-between;"> <div>ACCEPT</div> <div>REJECT</div> <div>BY</div> <div>DATE</div> </div>	
3	MATERIAL Solid Fiberboard (0.051-inch Min.) Thickness		<div style="text-align: center;">RADIOGRAPHIC INSPECTION</div> <div style="display: flex; justify-content: space-between;"> <div>ACCEPT</div> <div>REJECT</div> <div>BY</div> <div>DATE</div> </div>	
4	LID LENGTH (85.5-inch + Zero - 1/2-inch)		<div style="text-align: center;">MATERIAL CERTIFICATION</div> <div style="display: flex; justify-content: space-between;"> <div>ACCEPT</div> <div>REJECT</div> <div>BY</div> <div>DATE</div> </div>	
5	LID WIDTH (49-inch + Zero - 1/2-inch)		<div style="text-align: center;">OVERALL ACCEPTANCE</div> <div style="display: flex; justify-content: space-between;"> <div>ACCEPT</div> <div>REJECT</div> <div>BY</div> <div>DATE</div> </div>	
6	LID FOLD FLAP 3-Inch Min		ILLUSTRATION	
7	BODY LENGTH (85.5-inch + Zero - 1/2-inch)			
8	BODY WIDTH (49-inch + Zero - 1/2-inch)			
9	BODY HEIGHT (49-inch + Zero - 1/2-inch)			
			<div style="display: flex; justify-content: space-between;"> <div>REV.</div> <div>DESCRIPTION</div> <div>DATE</div> </div> <div style="display: flex; justify-content: space-between;"> <div>APPROVALS</div> <div>TITLE</div> </div> <div style="display: flex; justify-content: space-between;"> <div>DATE</div> <div>TOTAL SHEET</div> <div>SIZE</div> <div>DRAWING NUMBER</div> </div> <div style="display: flex; justify-content: space-between;"> <div></div> <div>NUMBER</div> <div>SHEET</div> <div>ISSUE</div> </div>	

EXHIBIT "B"  
FIBERBOARD LINER  
SIZE TWO  
INSPECTION FORM

ITEM NO	SPECIFICATION	INSPECTION ENTRY	DRAWING NUMBER 38812-001	PURCHASE ORDER NO P.O. #	
1	QUANTITY IN LOT		RIRS NO RIRS #		
2	IDENTIFICATION INFORMATION Record Identification SX-208 Size Two Date Manufactured Manufacturer's Identification		DIMENSIONAL INSPECTION		
			INSPECTED BY	DATE INSPECTED   SHIFT	
			ACCEPT   REJECT	BY   DATE	
3	MATERIAL Solid Fiberboard (0.051-inch Min) Thickness		RADIOGRAPHIC INSPECTION		
			ACCEPT   REJECT	BY   DATE	
4	LID LENGTH (81.5-inch + Zero - 1/2-inch)		MATERIAL CERTIFICATION		
			ACCEPT   REJECT	BY   DATE	
5	LID WIDTH (43-inch + Zero - 1/2-inch)		OVERALL ACCEPTANCE		
			ACCEPT   REJECT	BY   DATE	
6	LID FOLD FLAP 3-Inch Min		ILLUSTRATION		
7	BODY LENGTH (81.5-inch + Zero - 1/2-inch)				
8	BODY WIDTH (43-inch + Zero - 1/2-inch)				
9	BODY HEIGHT (43-inch + Zero - 1/2-inch)				
			REV	DESCRIPTION	DATE
			APPROVALS	TITLE	
			DATE	TOTAL SHEET	SIZE
			DRAWING NUMBER		
			NUMBER	SHEET	ISSUE

EXHIBIT "C"  
FIBERBOARD LINER  
SIZE THREE  
INSPECTION FORM

ITEM NO	SPECIFICATION	INSPECTION ENTRY	DRAWING NUMBER	PUPC-ASE ORDER NO
			28812-001	P.O. #
			RIRS NO	
			RIRS #	
1	QUANTITY IN LOT			
2	IDENTIFICATION INFORMATION Record Identification SX-208 Size Three Date Manufactured Manufacturer's Identification		DIMENSIONAL INSPECTION	
			INSPECTED BY	DATE INSPECTED   SHIFT
			ACCEPT   REJECT	BY   DATE
3	MATERIAL Solid Fiberboard (0.051-inch Min) Thickness		RADIOGRAPHIC INSPECTION	
			ACCEPT   REJECT	BY   DATE
4	LID LENGTH (72-inch + Zero - 1/2-inch)		MATERIAL CERTIFICATION	
			ACCEPT   REJECT	BY   DATE
5	LID WIDTH (45-inch + Zero - 1/2-inch)		OVERALL ACCEPTANCE	
			ACCEPT   REJECT	BY   DATE
6	LID FOLD FLAP 3-Inch Min		ILLUSTRATION	
7	BODY LENGTH (72-inch + Zero - 1/2-inch)			
8	BODY WIDTH (45-inch + Zero - 1/2-inch)			
9	BODY HEIGHT (33.5-inch + Zero - 1/2-inch)			
			REV.	DESCRIPTION   DATE
			APPROVALS	TITLE
			DATE	TOTAL SHEET   SIZE   DRAWING NUMBER
				NUMBER   SHEET   ISSUE

EXHIBIT "D"  
FIBERBOARD LINER  
SIZE FOUR  
INSPECTION FORM

ITEM NO	SPECIFICATION	INSPECTION ENTRY
1	QUANTITY IN LOT	
2	IDENTIFICATION INFORMATION Record Identification SX-208 Size Four Date Manufactured Manufacturer's Identification	
3	MATERIAL Solid Fiberboard (0.051-inch Min) Thickness	
4	LID LENGTH (65.5-inch + Zero - 1/2-inch)	
5	LID WIDTH (49-inch + Zero - 1/2-inch)	
6	LID FOLD FLAP 3-Inch Min	
7	BODY LENGTH (65.5-inch + Zero - 1/2-inch)	
8	BODY WIDTH (49-inch + Zero - 1/2-inch)	
9	BODY HEIGHT (33.5-inch + Zero - 1/2-inch)	

DRAWING NUMBER	PURCHASE ORDER NO.
28812-001	P.O. #
RIRS NO.	RIRS #

DIMENSIONAL INSPECTION			
INSPECTED BY	DATE INSPECTED	SHIFT	
ACCEPT	REJECT	BY	DATE

RADIOGRAPHIC INSPECTION			
ACCEPT	REJECT	BY	DATE

MATERIAL CERTIFICATION			
ACCEPT	REJECT	BY	DATE

OVERALL ACCEPTANCE			
ACCEPT	REJECT	BY	DATE

ILLUSTRATION			

REV.	DESCRIPTION	DATE
APPROVALS TITLE		
DATE	TOTAL SHEET	SIZE
DRAWING NUMBER		
NUMBER SHEET ISSUE		

EXHIBIT "E"  
FIBERBOARD LINER  
SIZE FIVE  
INSPECTION FORM

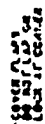
[illegible]



EXHIBIT "F"  
FIBERBOARD LINER  
TRUPACT II  
INSPECTION FORM

ITEM NO	SPECIFICATION	INSPECTION ENTRY	DRAWING NUMBER	PUPC-ASE ORDER NO															
			38812-001	P.O. #															
			RIRS NO																
			RIRS #																
1	QUANTITY IN LOT																		
2	IDENTIFICATION INFORMATION Record Identification: SX-208 Trupact II Date Manufactured Manufacturer's Identification		<div style="text-align: center;">DIMENSIONAL INSPECTION</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">INSPECTED BY</td> <td style="width: 33%;">DATE INSPECTED</td> <td style="width: 34%;">SHIFT</td> </tr> <tr> <td>ACCEPT</td> <td>REJECT</td> <td>BY</td> </tr> <tr> <td></td> <td></td> <td>DATE</td> </tr> </table>		INSPECTED BY	DATE INSPECTED	SHIFT	ACCEPT	REJECT	BY			DATE						
INSPECTED BY	DATE INSPECTED	SHIFT																	
ACCEPT	REJECT	BY																	
		DATE																	
3	MATERIAL Solid Fiberboard (0.051-inch Min) Thickness		<div style="text-align: center;">RADIOGRAPHIC INSPECTION</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">ACCEPT</td> <td style="width: 33%;">REJECT</td> <td style="width: 34%;">BY</td> </tr> <tr> <td></td> <td></td> <td>DATE</td> </tr> </table>		ACCEPT	REJECT	BY			DATE									
ACCEPT	REJECT	BY																	
		DATE																	
4	LID LENGTH OVERALL (66-inch + Zero - 1/2-inch)		<div style="text-align: center;">MATERIAL CERTIFICATION</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">ACCEPT</td> <td style="width: 33%;">REJECT</td> <td style="width: 34%;">BY</td> </tr> <tr> <td></td> <td></td> <td>DATE</td> </tr> </table>		ACCEPT	REJECT	BY			DATE									
ACCEPT	REJECT	BY																	
		DATE																	
5	LID LENGTH STRAIGHT SIDE (43-inch + Zero - 1/2-inch)		<div style="text-align: center;">OVERALL ACCEPTANCE</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">ACCEPT</td> <td style="width: 33%;">REJECT</td> <td style="width: 34%;">BY</td> </tr> <tr> <td></td> <td></td> <td>DATE</td> </tr> </table>		ACCEPT	REJECT	BY			DATE									
ACCEPT	REJECT	BY																	
		DATE																	
6	LID WIDTH (49-Inch + Zero - 1/2-inch)		ILLUSTRATION																
7	LID FOLD FLAP 3-inch Min																		
8	BODY LENGTH STRAIGHT SIDES (43-inch + Zero - 1/2-inch)																		
9	BODY HEIGHT (32-inch + Zero - 1/2-inch)																		
10	LID ENDS RADIUS (33-inch + Zero - 1/2-inch)																		
11	BODY ENDS RADIUS (33-inch + Zero - 1/2-inch)																		
			<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">REV.</td> <td style="width: 60%;">DESCRIPTION</td> <td style="width: 30%;">DATE</td> </tr> <tr> <td colspan="2">APPROVALS</td> <td>TITLE</td> </tr> <tr> <td>DATE</td> <td>TOTAL SHEET</td> <td>SIZE</td> </tr> <tr> <td></td> <td></td> <td>DRAWING NUMBER</td> </tr> <tr> <td></td> <td></td> <td>NUMBER   SHEET   ISSUE</td> </tr> </table>		REV.	DESCRIPTION	DATE	APPROVALS		TITLE	DATE	TOTAL SHEET	SIZE			DRAWING NUMBER			NUMBER   SHEET   ISSUE
REV.	DESCRIPTION	DATE																	
APPROVALS		TITLE																	
DATE	TOTAL SHEET	SIZE																	
		DRAWING NUMBER																	
		NUMBER   SHEET   ISSUE																	

**NOTES**



**FILE-52**

ROCKY FLATS PLANT SITE, CARO 43 SX 209 - 22-CHIEF T

CCIMPLED ORNAY

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100



# Rockwell International

Atomics International Division  
Rocky Flats Plant  
P O Box 464  
Golden Colorado 80401

## STANDARD FOR PRESSURE-SENSITIVE ADHESIVE VINYL PLASTIC TAPE

F	Rev Per DCR SX-122-05	3-2-84	CD	2-11-84	E-H	3/11/84	C.S.S.	moj	
E	Add Appendix DCR SX-122-05	E-H	CD	1-11-84	1-11-84	1-11-84			
D	Add specs for 1-1/2" tape Per DCR SX-122-05	E-H	CD	1-11-84	1-11-84	8-17-88	1-11-84		
ISSUE	DESCRIPTION	HS&E	POE	WHSE	OHP	DATE	BY	APPR'D	CLASS
C	Rev para 1 1, 1 2, 2 2 1, 2 3, added para 3 3, Rev para 4 & Appx para 2, 3 4.	1-11-84	1-11-84	1-11-84	1-11-84				
B	General Editing	RGD	FKP	SJM	—	4-5-76	VMP	SIC	DI
A	ORIGINAL ISSUE		DWC	SJM	—	10-24-75	JWL		FRM
ISSUE	DESCRIPTION	HS&E	OHP	WHSE	CPSD	DATE	BY	APPR'D	CLASS (REVIEW)
									DESIGN ENGRG DEPT

Revision to this standard shall be accomplished by Design Engineering Procurement Quality Engineering  
Section and approved by Health, Safety and Environmental  
Warehouse  
Operational Health Physics

WAREHOUSE STOCK

ROCKY FLATS PLANT STD

010 01-06-06  
010 01-06-08  
010 01-06-07  
010 06-13-04

CLASS NUMBER

NO. SX-122

STANDARD  
FOR  
PRESSURE-SENSITIVE ADHESIVE VINYL PLASTIC TAPE

1 SCOPE

This standard defines the requirements for pressure-sensitive, single side adhesive, vinyl plastic tape used for air-tight sealing of vinyl and polyethylene sheeting and a variety of other materials

2 GENERAL

The provisions of this Standard are not intended to prevent the use of alternates or modifications to the standard in individual cases where such alternates or modifications are obviously required to obtain the results desired. Such alternates or modifications shall be approved, in writing, by the Buyer

3 REQUIREMENTS

3.1 MATERIAL

The materials used in the manufacture of this tape shall ensure performance of the tape in accordance with the requirements of this standard

3.1.1 The backing material shall consist of plasticized polyvinyl chloride film

3.1.2 The adhesive shall be pressure-sensitive, water insoluble and shall require no moisture, heat or other preparation prior to or after application to clean dry surfaces to obtain immediate and firm adhesion. The adhesive shall be smoothly and evenly distributed on one side of the backing

3.2 FINISHED TAPE

3.2.1 The tape shall be wound evenly and uniformly, adhesive side in, on cores made of paper fiber or plastic. The cores shall be sufficiently rigid to prevent distortion of the roll under normal conditions of transportation and use

3.2.2 The inside diameter of the core shall be 3 inches  $\pm$  1/8 inch

3.2.3 When the roll is unwound, the backing shall not tear and the adhesive shall not separate from the face of the tape or transfer to the back of the adjacent layer

3.2.4 There shall be no sections of tape with adhesive discontinuities greater than 3 inches long, or an aggregate discontinuity of more than 18 inches on any roll of tape

3.2.5 No more than two (2) splices per roll shall be permitted

3 2 6 The tape shall be furnished in the color(s) specified on the purchase order

3 2 7 The tape shall be furnished in the following widths as specified in the purchase order

<u>Width</u>	<u>Tolerance</u>
One (1) inch	$\pm 1/16$ inch
One and one half (1-1/2) inch	$\pm 1/16$ inch
Two (2) inches	$\pm 3/32$ inch
Six (6) inches	$\pm 1/4$ inch

Each roll shall be at least 36 yards long.

3 2 8 The tape shall have the physical properties listed in Table I

### 3 3 WORKMANSHIP

The tape shall contain no foreign matter The tape edges shall be straight, true and without nicks or gouges

## 4 QUALITY ASSURANCE PROVISIONS

### 4 1 ACCEPTANCE

The Buyer's acceptance will be based on certification and test results received from the Seller

### 4 2 REJECTION

The Buyer reserves the right to reject an entire lot of material when the lot contains defective material. A lot shall be defined as all material from the same Vendor mill run, all material received in one shipment, or all material of one size received in one shipment.

### 4 3 CERTIFICATION

The vendor shall submit a statement of certification and test results indicating compliance with all requirements of this standard for each lot of material delivered to the Rocky Flats Plant. The test results shall be submitted using Appendix A.

### 4 4 AUDITS/APPROVALS

4 4 1 The Buyer reserves the right to perform periodic audits and/or independent testing of products received to assure compliance with these requirements and the continued accuracy of laboratory analysis

4 4 2 The Buyer reserves the right to disapprove testing laboratory

## 5 PREPARATON FOR DELIVERY

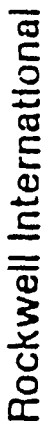
Sixty (60) rolls of 1-inch tape, 40 rolls of 1 1/2-inch tape, 30 rolls of 2-inch tape, or 8 rolls of 6-inch tape shall be packed in each carton without individual wrappings. The cartons shall be sufficiently strong to protect the tape from damage during handling and transit. Each carton shall be marked with the manufacturer's name or trade name, tape size and the date of manufacturer. Each carton shall be marked on one end and one side in 1/2-inch high numbers showing the quantity of rolls of tape per carton and the Rocky Flats Plant Warehouse Stock Numbers, if applicable, as follows

One (1) inch tape, yellow	"Warehouse Stock #010-01-06-06"
One and one-half (1-1/2) inch tape, black	"Warehouse Stock #010-01-06-08"
Two (2) inch tape, yellow.	"Warehouse Stock #010-01-06-07"
Six (6) inch tape, yellow	"Warehouse Stock #010-06-13-04"
Two (2) inch tape, white	"Warehouse Stock #010-06-03-05"

END OF STANDARD

TABLE I  
PHYSICAL PROPERTY REQUIREMENTS

<u>Property</u>	<u>Test Method</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Unit of Measure</u>
Thickness	ASTM D-1000	0 0045	0 0065	- inches
Tensile strength lengthwise	ASTM D-1000	10	--	lb/inch width
Ultimate elongation	ASTM D-1000	100	--	Percent
Adhesion to Steel	ASTM D-1000 180° peel test	20	--	oz/inch width
Adhesion to Backing	ASTM D-1000 180° peel test	16	--	oz/inch width



## APPENDIX A

## VINYL PLASTIC TAPE INSPECTION SHEET

[illegible]



# CERTIFICATION OF LLW

## SECTION 1 CERTIFICATION OF AS-RECEIVED LINED CONTAINER

PLYWOOD BOX NO  
INSPECTION LOT

HD 1055-78-01106  
1578

DRUM NO  
SEAL NO

LINING OK ( )  
WOOD OK ( )  
CHAIN & LOCK ( )

NO EXCESSIVE CORROSION ( )  
NO HOLES, WARPAGE ( )  
LINING OK ( )

INSPECTOR \_\_\_\_\_ DATE \_\_\_\_\_ SUPERVISION \_\_\_\_\_  
ACCEPT ( ) REJECT ( ) HOLD ( )

## SECTION II INSPECTION AFTER FILLING CONTAINER

PLYWOOD BOX  
MONITOR CHECK ( )  
LOG SHEET COMPLETE ( )  
LINER CLOSE-UP ( )  
NO LIQUID IN BOX ( )  
NON-Pu CONTAMINATED ( )  
Pu CONTAMINATED ( )

DRUMS  
MONITOR CHECK ( )  
NO LIQUID IN DRUM ( )  
1 BAG OF VERMICULITE ( )  
TORQUE 40 +/- 5' LBS ( )  
DOT 7A STICKER ( )

DATE OF CLOSE-UP \_\_\_\_\_

IDC CODE \_\_\_\_\_

INSPECTOR \_\_\_\_\_ DATE \_\_\_\_\_ SUPERVISION \_\_\_\_\_

CERTIFIER \_\_\_\_\_ DATE \_\_\_\_\_  
ACCEPT ( ) REJECT ( ) HOLD ( )

## SECTION III FINAL INSPECTION AND LOADING

STENCILING ( )	RETURN ADDRESS ( )	LABELING ( )
VISUAL CHECK ( )	PLACARDING ( )	NY 211 ( )
MONITOR SURVEY OF TRAILER ( )		VISUAL INSPECTION OF TRAILER ( )

WEIGHT (LBS) \_\_\_\_\_

TRAILER NO \_\_\_\_\_

INSPECTOR \_\_\_\_\_ DATE \_\_\_\_\_ SUPERVISION \_\_\_\_\_

COMMENTS \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## PONDCRETE BOX LOG SHEET

FORM NO

4993

1	PLYWOOD BOX NUMBER <u>H01055-788-01106</u>	
	PONDCRETE TRIWALL #1 <u>07414</u>	WEIGHT <u>1430 lbs</u>
	PONDCRETE TRIWALL #2 <u>07422</u>	WEIGHT <u>1278 lbs</u>
	GROSS WEIGHT (1) <u>2708 lbs.</u>	WASTE TYPE <u>LLW MIXED</u> IDC <u>805</u> Pu <u>0 grams</u> Am <u>0 grams</u>
2	FILL VOIDS <u>n/a</u> AMOUNT SLUDGE TRANSFERRED _____ DATE _____ TIME _____ EMPLOYEE NO _____	
3	PENETROMETER TEST (To be performed by authorized operator different from operator who perform section 2) 1 <u>n/a</u> 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ EMPLOYEE NO _____ DATE _____ TIME _____	
4	PARTICULATE MATERIAL (To be performed by authorized operator different from operator who perform section 2) WEIGHT <u>&lt; 1%</u> EMPLOYEE NO [REDACTED] DATE <u>3-13-90</u>	
5	FREE LIQUIDS (To be performed by authorized operator different from operator who perform section 2) VOLUME <u>None</u> EMPLOYEE NO [REDACTED] DATE <u>3-13-90</u>	
6	WASTE CERTIFICATION (51368 INSP) PASS <u>Y</u> FAIL _____ EMPLOYEE NO _____ DATE <u>3-15-90</u>	
7	LINER CLOSURE <u>✓</u> EMPLOYEE NO [REDACTED] DATE <u>3-13-90</u>	
8	BOX CLOSURE <u>✓</u> EMPLOYEE NO [REDACTED] DATE <u>3-14-90</u>	
9	FINAL GROSS WEIGHT (2) <u>2770</u>	
10	BOX MARK & LABEL _____ EMPLOYEE NO [REDACTED] DATE <u>3-11-90</u> ACCUMULATION START DATE <u>11-24-87</u>	
11	RADIATION MONITORING SURFACE MREM <u>0.0</u> METER MREM <u>0.0</u> NEUTRON MREM <u>0.0</u>	
12	CERTIFICATION I certify to the Rocky Flats Traffic Department that the waste form identified above is a solid as defined by the DOT (ASTM 4359-84) and has been verified by testing and inspection to comply with all DOT requirements and NTS waste acceptance criteria. I also certify that the waste package described herein has been marked and labeled in accordance with Traffic Procedure T-300-2. <u>[Signature]</u> _____ [REDACTED] <u>3/15/90</u> Certifier Signature Waste Operations Employee Number Date <u>[Signature]</u> _____ [REDACTED] <u>3-15-90</u> Certifier Signature Waste Certification Employee Number Date	
DISTRIBUTION WHITE TRAFFIC BLUE WASTE OPERATIONS CARD WASTE RECORD		

EG&G ROCKY FLATS

EG&G ROCKY FLATS INC  
Rock Flats Plant  
P.O. Box 46-  
Golden, Colorado 80402-046-

# Plutonium Contaminated Waste

BLOG NO

TENT 5  
DOMAC  
750 Pal

## RADIOACTIVE LSA

DRUM BOX NUMBER

H01055

CONTROL NUMBER

788-01106

GENERATOR SIGNATURE

Walter P. Valencia

GENERATOR EMPLOYEE NUMBER

[REDACTED]

DATE FILLED

3-13-90

ICL

GEOSCIENCE

OX C HAZARDOUS MATERIALS

805

2770-

AME

AMOUNT

SEE ROCKY FLATS PLANT WASTE LAND  
DISPOSAL RESTRICTION INFORMATION  
FOR IDC 805 (PONDCRETE)

ISOTOPE

FISSION

DISCARD

RECOVER

Pu

0

X

ISOTOPE

FISSION

GENERATOR EMPLOYEE NUMBER

DATE

Am

0

N/A

N/A

RADIATION LEVELS

Gamma

0.1

Surface

0.0

MR/hr @ 1 M

Neutron

0.0

Surface

0.0

mrem/hr @ 1 M

TOTAL

0.1

Surface

0.0

mrem/hr @ 1 M

Monitors

Transfer

EMPLOYEE NO

[REDACTED]

Date

3-14-90

INSPECTED

VIC  
513631  
NSP

INSPECTION DATE

3-15-90

SEAL NUMBER

N/A

COMMENTS

FIXED - 25 CM OUTSIDE

3-14-90 Monitor Transfer

REMOVABLE - 20 D M/100 CM OUTSIDE

3-14-90 Monitor Transfer

Acc. Date: 4/29/90

TRIPLE WALL BOX # 07422

WEIGHT (POUNDS)

1278

## PENETRATOR READINGS (TONS/SQ. FT.)

PASS

FAIL

(CIRCLE ONE)

TOP	>4.5	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0	.75	<.75
SIDE 1	>4.5	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0	.75	<.75
SIDE 2	>4.5	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0	.75	<.75
SIDE 3	>4.5	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0	.75	<.75
SIDE 4	>4.5	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0	.75	<.75

SURFACE TEMPERATURE (F)

45.0°F

EMPLOYEE #

DATE

3/13/90

## PASTEURIZATION

PASS

FAIL

(CIRCLE ONE)

WEIGHT

2 1/10

EMPLOYEE #

DATE

3/13/90

## FREE LIQUIDS

PASS

FAIL

(CIRCLE ONE)

EMPLOYEE #

DATE

3/13/90

## PASTE CERTIFICATION

EMPLOYEE #

DATE

3-13-90

PASS

FAIL

(CIRCLE ONE)

COMMENTS

4/29/87  
Acen. Date: 3/13/90

TRAFFIC WALL BOX # 07414 WEIGHT (POUNDS) 1430

PERFORMANCE READINGS (TONS/SQ. FT.) PASS FAIL (CIRCLE ONE)

TOP	>4.5	4.5	4.0	3.5	3.0	2.5	<u>2.0</u>	1.5	1.0	.75	<.75
SIDE 1	>4.5	<u>4.5</u>	4.0	3.5	3.0	2.5	2.0	1.5	1.0	.75	<.75
SIDE 2	>4.5	<u>4.5</u>	4.0	3.5	3.0	2.5	2.0	1.5	1.0	.75	<.75
SIDE 3	<u>&gt;4.5</u>	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0	.75	<.75
SIDE 4	>4.5	<u>4.5</u>	4.0	3.5	3.0	2.5	2.0	1.5	1.0	.75	<.75

SURFACE TEMPERATURE (F) 41.6°

EMPLOYEE # [REDACTED] DATE 3/13/90

PERFORMANCE MATERIAL PASS FAIL (CIRCLE ONE)  
 WEIGHT <100 EMPLOYEE # [REDACTED] DATE 3/13/90

FREE LIQUIDS PASS FAIL (CIRCLE ONE)  
 EMPLOYEE # [REDACTED] DATE 3/13/90

FAST CERTIFICATION EMPLOYEE # [REDACTED] DATE 3 13 90

PASS FAIL (CIRCLE ONE)

COMMENTS

# WASTE CERTIFICATION

## Checklist for Pondcrete

Box HO 1055 788-01106

### BOX CLOSURE INSPECTION

	Condition of box acceptable
	No holes (or Oil-Dry added)
	Liner acceptable (check for tears)
	Cardboard liner present
	Verify liner closure
	Gung acceptable
	Nail bottom contact
	Bandage contact

### FINAL INSPECTION



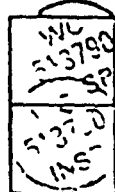
#### MARKING AND LABELING

- ☒ RQ RADIOACTIVE LSN
- ☒ RETURN ADDRESS
- ☒ WEIGHT (<500 LBS)
- ☒ EPA CODES
- ☒ HAZ WASTE LABEL See Date
- ☒ PROPER SHIPPING NAME
- ☒ PROPER EPA CODES
- ☒ ACCUMULATION START DATE
- ☒ RFT readings
- ☒ SHIPPING WEIGHTS
- ☒ SHIPPING BOXES
- ☒ SHIPPING BOXES

### LOADING INSPECTION

Trailer # NW 6950

Load Id # 9003-77



Verify trailer inspection form shows acceptance by the Traffic Dept.

Visually inspect trailer  
Contact WNC supervisor if any concerns.

#### COMMENTS

Verify manifest doc # 00060

☒ on manifest  
☒ on manifest box

Verify NV-211 is signed, dated and attached to the right box.

Using two people, verify proper boxes are loaded

Verify acceptable condition of boxes and labels

### ON-SITE SHIPPING INSPECTION

	Mark here if not applicable
	RFT readings present and within limits: surface <200 m/s/hr 1 meter <10 m/s/hr
	On-site shipping label affixed
	On-site hazardous waste label affixed.
	Folger attached to box (with white label showing)





ENERGY SYSTEMS GROUP  
ROCKWELL INTERNATIONAL

Rocky Flats Plant  
P O Box 484  
Golden, Colorado 80401

STANDARD FOR  
PVC LINER FOR TRIPLE WALL BOX

C	Revised Para 1., Inspec. Form, Fig 1 per DCR-X-220-2	11/1/81	11/1/81	11/1/81	11/1/81	9-17-84	Case	SPC	JLJ
B	Addition of reference made per DCR X-220-1	11/1/81	11/1/81	11/1/81	11/1/81	8-17-81	Case	SPC	JLJ
A	ORIGINAL ISSUE	11/1/81	11/1/81	11/1/81	11/1/81	5/10/80	Hirner	SPC	JLJ
ISSUE	DESCRIPTION	QE&C	WP	HS&E	Traffic	DATE	BY	APPR D	CLASS REVIEW
DESIGN ENGRG DEPT									

Revision to this standard shall be accomplished by Design Engineering Mechanical Process  
Section and approved by Quality Engineering and Control, Waste Processing, Health, Safety &  
Environment, and Traffic

STANDARD FOR  
PVC LINER FOR TRIPLE-WALL BOX

1. DESCRIPTION

PVC liner for a triple-wall corrugated fiberboard box. Either full size (100 in. long) or half size (70 in. long).

2. REQUIREMENTS

2.1 MATERIAL

Material shall be plasticized polyvinyl chloride sheet, translucent, matte finish, 2,200 pounds per square inch (psi) minimum tensile strength, 0.011 in. minimum thickness. Cold flexibility per paragraphs 3.6.3 and 4.5.3 of Military Specification MIL-L-10547 is required.

2.2 DIMENSIONS

Liner inside dimensions shall comply with the requirements of Figure 1. Variation in form such as squareness and perpendicularity shall fall within specified limits.

2.3 FABRICATION AND ASSEMBLY

Location of the seams must comply with Figure 1. Heat-sealed seams shall have a tensile strength of 1,000 psi minimum.

2.4 LEAKAGE

Each finished liner shall be free of visible leaks.



## 2.5 WORKMANSHIP

Each liner shall be uniformly constructed and free of foreign material, imbedded particles, pinholes, tears, blisters, sharp creases, or other imperfections which might impair its function.

## 2.6 IDENTIFICATION

Each liner shall be durably and legibly ink stamped with the standard number, date of manufacture, and manufacturer's identification on one of the side flaps.

EXAMPLE    SX-220  
              3/15/80  
              ABC PLASTIC COMPANY

## 3. QUALITY PROVISIONS

### 3.1 CERTIFICATION

The manufacturer must provide a letter of certification, signed by a duly authorized agent of the company, verifying that the materials of construction and the fabrication parameters required by this standard have been met.

The manufacturer must also provide copies of laboratory reports showing the actual "MATERIAL TENSILE STRENGTH" and "SEAM TENSILE STRENGTH" on which the certification of compliance with this standard is based.

### 3.2 ACCEPTANCE

The Buyer's acceptance will be based on detailed dimensional and visual examination of representative samples selected at will by the Buyer's representatives. The Acceptance Quality Level (AQL) will be those

stated in the Buyer's Quality Inspection Directive (QID), a copy of which may be obtained upon request.

### 3.3 REJECTION

The Buyer may reject all or part of any lot which does not meet the requirements set forth in this standard.

### 3.4 VENDOR SOURCE ACCEPTANCE

Procurement documents for the PVC liner for the triple-wall box may specify Vendor Source Acceptance (VSA), which consists of Rockwell personnel monitoring the vendor's production of the liners. This is to verify that the vendor's process and inspections are producing liners that meet the requirements of this standard. Rockwell personnel will inspect preproduced or purchased PVC liners before the start of production. Rockwell personnel will monitor the production run utilizing the vendor's inspection points and adding inspection points where deemed necessary. A representative sample of each lot will be monitored for dimensional tolerances, visual defects, and the results of testing requirements. If this observation reflects inadequate production performance, per SX-220 requirements, Rockwell personnel may request corrective actions be taken by the vendor to rectify this condition. Shipping and handling methods will be observed to meet Rockwell standard requirements. This VSA inspection does not release the vendor of the responsibility of specification compliance in any of the above areas.

## 4. PACKAGING AND SHIPPING

Good commercial packaging methods shall be used to ensure damage-free delivery of product. The identification required in Section 2 shall be marked on the outside of each unit package of liners.

## 5. REFERENCE

Refer to Rocky Flats Plant Standard SX-219, Assembly of Triple-Wall Corrugated Fiberboard Package, for list of standards relating to the triple-wall corrugated fiberboard package.

APPENDIX TO STANDARD SX-220  
INSPECTION FORM

[illegible]

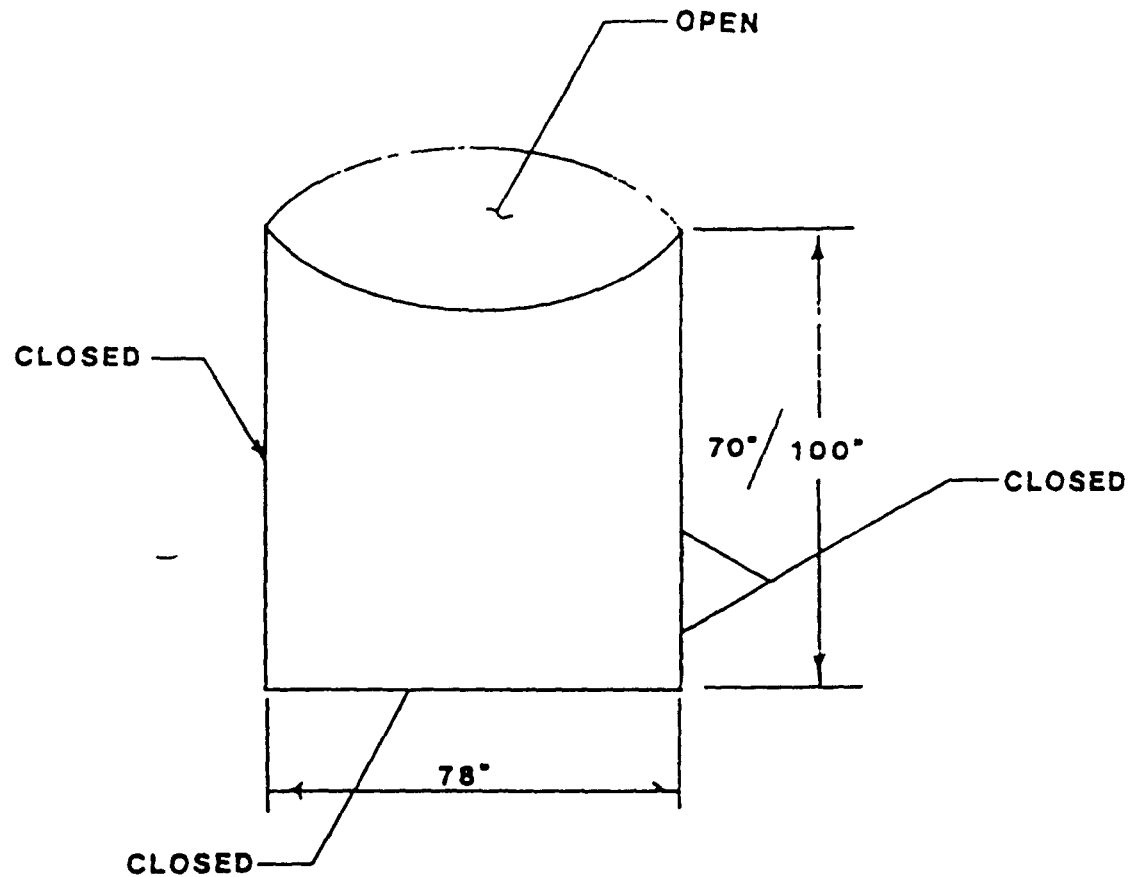


FIGURE 1. PVC LINER FOR TRIPLE WALL CORRUGATED BOX

NOTE ALL DIMENSIONS SHOWN ARE INCHES AND FROM THE INSIDE OF THE LINER. SQUARENESS AND PERPENDICULARITY SHALL FALL WITHIN PLUS OR MINUS 1 INCH.

ALL SEAMS SHALL HAVE 1,000 PSI MIN. SEAM STRENGTH AND BE LEAK TIGHT.



ENERGY SYSTEMS GROUP  
ROCKWELL INTERNATIONAL

Rocky Flats Plant  
P O Box 484  
Golden Colorado 80401

STANDARD FOR  
TRIPLE WALL BODY , OUTER CAP,  
AND INSERT CAP

F	General Rewrite - Revised per DCR SX-222-05	<i>[Signature]</i>	<i>[Signature]</i>	2-14-89	<i>[Signature]</i>	7/2/80	KJS	<i>[Signature]</i>	S.H.S.S.K
E	Rev Para 's 1 , 2 8 2, 2 9, 5 and added Para 6 Per DCR-X-222-4	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	9-17-84	Case	<i>[Signature]</i>	<i>[Signature]</i>
D	Addition of pkg & shipping reg & reference per DCR X-222-3	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	9/1/81	JNC	<i>[Signature]</i>	<i>[Signature]</i>
C	Edited text, & d'g 20-18-2 per DCR X-222-2	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	7/17/81	JNC	<i>[Signature]</i>	<i>[Signature]</i>
B	ADDED INNER CAP AND NEW TEXT DCRX222-1	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	4/22/81	DLG	<i>[Signature]</i>	<i>[Signature]</i>
A	ORIGINAL ISSUE	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	5/10/80	Hurren	<i>[Signature]</i>	<i>[Signature]</i>
ISSUE	DESCRIPTION	POE	WC&P	HS&E	Traffic	DATE	BY	APPR D	CLASS REVIEW
DESIGN ENGRG DEPT									

Revision to this standard shall be accomplished by Design Engineering Mechanical Process  
Section and approved by Procurement Quality Engineering  
Waste Compliance and Planning  
Health, Safety and Environment  
Traffic

STANDARD  
FOR  
TRIPLE-WALL BODY WITH  
SINGLE WALL OUTER CAP AND INSERT CAP

1 DESCRIPTION

This Standard defines selected dimensional and material requirements for the triple-wall body, outer cap, and insert cap for the corrugated fiberboard package

2 GENERAL

The provisions of this Standard are not intended to prevent the use of alternates or modifications to the standard in individual cases where such alternates or modifications are obviously required to obtain the results desired. Such alternates or modifications shall be approved, in writing, by the Buyer.

3 REFERENCES

- 3 1 Federal Spec PPP-B-640-D Boxes, Fiberboard, Corrugated Triple-Wall
- 3 2 Federal Spec PPP-F-320-D Corrugated and Solid Sheet Stock (Container Grade) and Cut Shapes
- 3 3 Federal Spec PPP-B-636-H Boxes, Shipping, Fiberboard

4 FIBERBOARD REQUIREMENTS FOR TRIPLE-WALL BODY

- 4 1 The triple wall body shall consist of three (3) corrugated sections, two (2) mediums, and two (2) facings fabricated into a triple-wall structural material. The triple-wall corrugated material need not be weather resistant.
- 4 2 The intermediate and one (1) outer flute shall be Type "A" flutes. The remaining flutes may be either Type "A" or Type "C" flutes. The "AAA" and "CAA" flute arrangements will be acceptable only if the fiberboard can meet or exceed the puncture resistance and short column crush strength requirements of Paragraphs 4 6 and 4 7.

NOTE Type "A" Flute = 36 flutes per foot  $\pm$  3 flutes

Type "C" Flute = 42 flutes per foot  $\pm$  3 flutes

- 4 3 The facings and corrugated media shall be securely bonded over the entire area of contact using manufacturer's standard adhesive.
- 4 4 The thickness of the finished fiberboard with an AAA or CAA fluting arrangement shall be 9/16-inch with a  $\pm$ 1/32-inch tolerance.

4 5 The fiberboard shall weigh not more than 430 pounds per 1000 square feet, plus 5 percent tolerance

4 6 The fiberboard shall have a minimum of three (3) puncture tests performed. Each test shall have a minimum puncture test value of 1,100-inch-ounces per inch of tear. When tested, only one (1) puncture reading on each specimen may fall below the allowable minimum and that reading shall not be more than ten (10) percent below the allowable minimum.

4 7 The short column crush strength of the fiberboard shall be not less than 178 pounds per inch (lb /in )

#### 4 CONSTRUCTION REQUIREMENTS FOR THE TRIPLE-WALL BODY

4 1 Unless otherwise specified, the body dimensions (including scoring lines) as specified in Drawing 28418-2 shall have a tolerance of  $\pm 1/4$ -inch.

4 2 Construction shall be in accordance with Drawing 28418-2. The body shall be one (1) piece of triple-wall corrugated fiberboard scored to form a body semi-octagonal in shape. The body joint flap shall be not less than 2-inches wide, and both the strip and the overlapped portion of the body shall be completely crushed prior to stapling.

4 3 The direction of the flutes shall be vertical in the sides of the body. There shall be no surface breaks in the board when folded 180 degrees along the score lines parallel to the flute direction. (See Paragraph 6)

4 4 Alignment of the body edges at the joint flap shall be within  $1/4$ -inch of each other.

4 5 The metal staples shall be placed approximately on a 45 degree angle across the strip and shall be placed no more than 1-inch apart, the 1-inch measurement shall be from the lower tip of one (1) staple to the top tip of the staple directly below. The first and last staples shall be placed  $1/2$ -inch  $\pm 1/4$ -inch from the top and bottom of the flap. Staples shall be fully clinched to preclude a puncture hazard.

4 6 The wire for staples shall be flat, minimum size 0 103-inch wide by 0 010-inch thick. Tolerance of the width shall be +0 002 or -0 008-inch. Tolerance on the thickness shall be +0 0001-inch. The wire shall have a commercially applied coating or plating, such as zinc coat (galvanized or copperwash).

#### 5 WORKMANSHIP

Unless otherwise specified, fiberboard shall show no continuous visual surface break of the outer component ply. Scoring not uniform, of insufficient depth to effect fold without distortion, and/or surface breaks in score lines when folded 180 degrees shall not be acceptable. A rupture of the outer facing exposing the corrugating medium, or a continuous separation of the other fibers for a distance exceeding four (4) inches, shall be considered a surface break.



## 6 FIBERBOARD REQUIREMENTS FOR THE SINGLE-WALL CAP

### 6 1 FIBERBOARD DESCRIPTION

6 1 1 The fiberboard shall consist of a single corrugated section and two (2) facings fabricated into a single-wall structural material. The fiberboard cap shall be classed as domestic, Grade 275, Variety SW (single-wall) in accordance with Federal Spec PPP-F-320-0. The fiberboard shall have a minimum thickness of 0.125-inch and a minimum average burst strength of 275 psi.

6 1 2 The flute arrangement shall be Type "B" flute. Flute arrangements other than specified will be acceptable only if the fiberboard can comply with or exceed the burst strength requirement and have a minimum flat crush strength of 40 pounds per square inch (psi).

## 7 CONSTRUCTION REQUIREMENTS FOR THE OUTER CAP

7 1 Dimensions of the cap shall be as indicated in Drawing 28418-2 attached. Unless otherwise specified, the cap dimensions shall be inside measurements with a tolerance of  $\pm 1/4$ -inch.

7 2 Construction shall be in accordance with Drawing 28418-2. The outer cap shall be one (1) piece of corrugated fiberboard scored to form a cap designed to slip fit onto both ends of the fiberboard body. The cap shall be assembled and held together with a flap arrangement as shown. Unless otherwise specified, fiberboard shall be in accordance with Paragraph 6.

## 8 FIBERBOARD REQUIREMENTS FOR THE INSERT CAP

### 8 1 FIBERBOARD DESCRIPTION

The fiberboard shall consist of a single corrugated section and two (2) facings fabricated into a single-wall structural material or shall be solid fiberboard. The single-wall corrugated fiberboard and/or solid fiberboard shall be classed as domestic.

### 8 2 BURST STRENGTH

The corrugated and/or solid fiberboard shall have a minimum average burst strength of 125 psi.

## 9 CONSTRUCTION REQUIREMENTS FOR THE INSERT CAP

9 1 Dimensions of the insert cap shall be as specified in Drawing C-28418-4 and shall be close fitting to allow for only minimal movement.

9 2 Construction shall be in accordance with Drawing C-18418-4. The fiberboard shall be scored to form a cap which slip fits into the triple-wall corrugated fiberboard body. The fiberboard shall be in accordance with Paragraph 6.

## 10 PACKAGING AND SHIPPING REQUIREMENTS

10 1 Do not package more than 50 full size or 100 half size triple-wall box bodies to a pallet, 300 triple-wall box caps to a pallet, or 300 insert caps to a pallet

10 2 The supplier shall face each bundle, top and bottom, with a scrap of triple-wall board. Place corner protectors between the scrap board and the box bodies or caps, centered at each banding corner

10 3 The pallet shall provide enough ground clearance to enable a forklift to transport the bundle high enough to prevent the bodies or caps from touching the ground

## 11 CERTIFICATION

11 1 The manufacturer of the triple-wall box shall provide a letter of certification, signed by a duly authorized agent of the company, verifying that the materials, construction and fabrication requirements of Federal Specs PPB-640-D, PPP-F-320D, and PPP-B-636-H have been met

11 2 The manufacturer shall also provide copies of laboratory reports showing the actual "puncture resistance" and "short column crush strength" of the triple-wall board used in construction of the boxes

## 12 ACCEPTANCE

The Buyer's acceptance will be based on detailed dimensional and visual examination of representative samples selected at random by the Buyer's representatives. The Acceptance Quality Level (AQL) will be as stated in Section 11

## 13 REJECTION

13 1 The Buyer may reject all or part of any lot which does not meet the requirements set forth in this Standard including the following

13 1 1 Any tear, split, puncture or scuff extending through one ply

13 1 2 Slight scuff covering an area greater than 3 inches

13 1 3 Separation in excess of 1/4-inch from the edge of the material

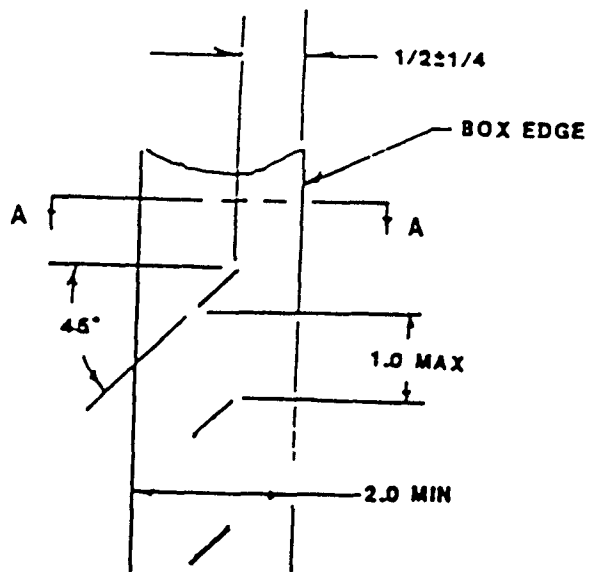
13 1 4 Improper fluting arrangement

13 2 Unless otherwise specified, fiberboard shall show no continuous visual surface break of the outer component ply. Scoring not uniform, of insufficient depth to effect fold without distortion, and surface breaks in score lines when folded 180 degrees shall not be acceptable. A rupture of the outer facing exposing the corrugating medium, or a continuous separation of the outer fibers for a distance exceeding four (4) inches, shall be considered a surface break.

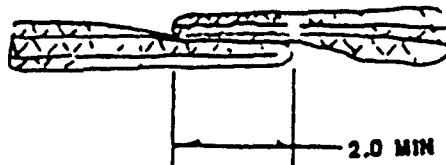
#### 14 VENDOR SOURCE ACCEPTANCE

Procurement documents for triple-wall corrugated fiberboard boxes may specify Vendor Source Acceptance (VSA), which will consist of Rockwell personnel monitoring the vendor's production of the boxes. This is to verify that the vendor's process and inspection procedures are producing boxes that meet the requirements of this Standard. Rockwell personnel will inspect preproduced or purchased box components before the start of production. Rockwell personnel will monitor the production run utilizing the vendor's inspection points and adding inspection points where deemed necessary. A representative sample of each lot will be monitored for dimensional tolerances, visual defects, and the results of testing requirements. If this observation reflects inadequate production performance, per Standard SX-222 requirements, Rockwell personnel may request corrective actions be taken by the vendor to rectify this condition. Shipping and handling methods will be observed to verify that they meet Rockwell standard requirements. This VSA inspection does not release the vendor from the responsibility for compliance with this Standard in any of the above areas.

END OF STANDARD TEXT



NOTE a The first and last staple shall be placed  $1/2$ -inch  $\pm 1/8$ -inch from the top and bottom of the flat. All dimensions in inches.



SECTION A-A  
SCALE NONE

SECTION A-A  
SCALE NONE

NOTE b: The body joint flap shall be not less than 2-inches wide, and both the strip and the overlapped portions of the body shall be completely crushed prior to stapling.

APPENDIX TO STANDARD NO SX-222  
INSPECTION FORM  
(TRIPLE WALL BOX BODY)

			DRAWING NUMBER		SERIAL NUMBER	
ITEM NO	SPECIFICATION	INSPECTION ENTRY	OTHER IDENTIFYING NUMBERS, IF ANY			
1	Dimensions per Section 4					
2	Scoring per Section 4					
3	Thickness per paragraph 4 4					
4	Correct material and fluting per Section 4					
5	1100 in.-oz puncture resistance per paragraph 4 6		<div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 5px;">DIMENSIONAL INSPECTION</div> <div style="display: flex; justify-content: space-between;"> <div>INSPECTED BY</div> <div>DATE INSPECTED</div> <div>SHIFT</div> </div> <div style="display: flex; justify-content: space-between;"> <div>ACCEPTED</div> <div>REJECTED</div> <div>BY</div> <div>DATE</div> </div>			
6	178 lbs.-in minimum short column crush per paragraph 4 7		<div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 5px;">RADIOGRAPHIC INSPECTION</div> <div style="display: flex; justify-content: space-between;"> <div>ACCEPTED</div> <div>REJECTED</div> <div>RADIOGRAPHIC REPT NO</div> <div>DATE</div> </div>			
7	Good workmanship per Section 5		<div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 5px;">MATERIAL CERTIFICATION</div> <div style="display: flex; justify-content: space-between;"> <div>ACCEPTED</div> <div>REJECTED</div> <div>BY</div> <div>DATE</div> </div>			
8	Fiberboard fastened with staples correctly spaced and clinched below surface per paragraph 4.5		<div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 5px;">OVERALL ACCEPTANCE</div> <div style="display: flex; justify-content: space-between;"> <div>ACCEPTED</div> <div>REJECTED</div> <div>BY</div> <div>DATE</div> </div>			
9	Folding requirements without surface breaks per Section 5		<div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 5px;">ILLUSTRATION</div> <div style="height: 150px;"></div>			
10	Fiberboard weight determined per paragraph 4.5					
11	Packaging and Shipping requirements per Section 10					
<p>NOTE This form lists the "PRELIMINARY DETERMINATION required prior to the first use of any packages as specified by DOE Order 5480.1, Ch III.</p>			<div style="display: flex; justify-content: space-between; border-bottom: 1px solid black; margin-bottom: 5px;"> <div>KEY</div> <div>DESCRIPTION</div> <div>DATE</div> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black; margin-bottom: 5px;"> <div>APPROVALS</div> <div>TITLE</div> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black; margin-bottom: 5px;"> <div>DATE</div> <div>TOTAL SHEETS</div> <div>SIZE</div> <div colspan="2">DRAWING NUMBER</div> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black; margin-bottom: 5px;"> <div></div> <div>NUMBER</div> <div>SHEET</div> <div>ISSUE</div> </div>			
18 ABOVE SPACE FOR REMARKS						

FORM 938 600

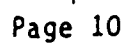
APPENDIX TO STANDARD No SX-222  
INSPECTION FORM  
(TRIPLE WALL BOX INSERT CAP)

			DRAWING NUMBER		SERIAL NUMBER													
ITEM NO	SPECIFICATION	INSPECTION ENTRY	OTHER IDENTIFYING NUMBERS, IF ANY															
1	Dimensions per Section 9 1																	
2	Scoring per Section 9 2																	
3	Burst strength per paragraph 8 2																	
4	Correct material and fluting per paragraph 6.1 and 6.2		<div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 5px;">DIMENSIONAL INSPECTION</div> <table style="width:100%; border-collapse: collapse;"> <tr> <td colspan="2">INSPECTED BY</td> <td colspan="2">DATE INSPECTED</td> <td colspan="2">SHIFT</td> </tr> <tr> <td>ACCEPTED</td> <td>REJECTED</td> <td>BY</td> <td colspan="2"></td> <td>DATE</td> </tr> </table>				INSPECTED BY		DATE INSPECTED		SHIFT		ACCEPTED	REJECTED	BY			DATE
INSPECTED BY		DATE INSPECTED		SHIFT														
ACCEPTED	REJECTED	BY			DATE													
5	Good workmanship per paragraph 9 2		<div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 5px;">RADIOGRAPHIC INSPECTION</div> <table style="width:100%; border-collapse: collapse;"> <tr> <td>ACCEPTED</td> <td>REJECTED</td> <td>RADIOGRAPHIC REPT NO</td> <td colspan="3">DATE</td> </tr> </table>				ACCEPTED	REJECTED	RADIOGRAPHIC REPT NO	DATE								
ACCEPTED	REJECTED	RADIOGRAPHIC REPT NO	DATE															
6	Construction requirements per paragraph 9 2		<div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 5px;">MATERIAL CERTIFICATION</div> <table style="width:100%; border-collapse: collapse;"> <tr> <td>ACCEPTED</td> <td>REJECTED</td> <td>BY</td> <td colspan="3">DATE</td> </tr> </table>				ACCEPTED	REJECTED	BY	DATE								
ACCEPTED	REJECTED	BY	DATE															
7	Shipping and Packaging requirements per paragraph 10		<div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 5px;">OVERALL ACCEPTANCE</div> <table style="width:100%; border-collapse: collapse;"> <tr> <td>ACCEPTED</td> <td>REJECTED</td> <td>BY</td> <td colspan="3">DATE</td> </tr> </table>				ACCEPTED	REJECTED	BY	DATE								
ACCEPTED	REJECTED	BY	DATE															
<div style="border: 1px solid black; padding: 10px; min-height: 200px;"> <p>NOTE This form lists "PRELIMINARY DETERMINATION" required prior to the first use of any package as specified by DOE Order 5480 1, Ch III</p> </div>			ILLUSTRATION															
			REV	DESCRIPTION		DATE												
			APPROVALS		TITLE													
			DATE	TOTAL SHEETS	SIZE	<div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 5px;">DRAWING NUMBER</div> <table style="width:100%; border-collapse: collapse;"> <tr> <td>NUMBER</td> <td>SHEET</td> <td>ISSUE</td> </tr> </table>	NUMBER	SHEET	ISSUE									
NUMBER	SHEET	ISSUE																
USE ABOVE SPACE FOR REMARKS																		

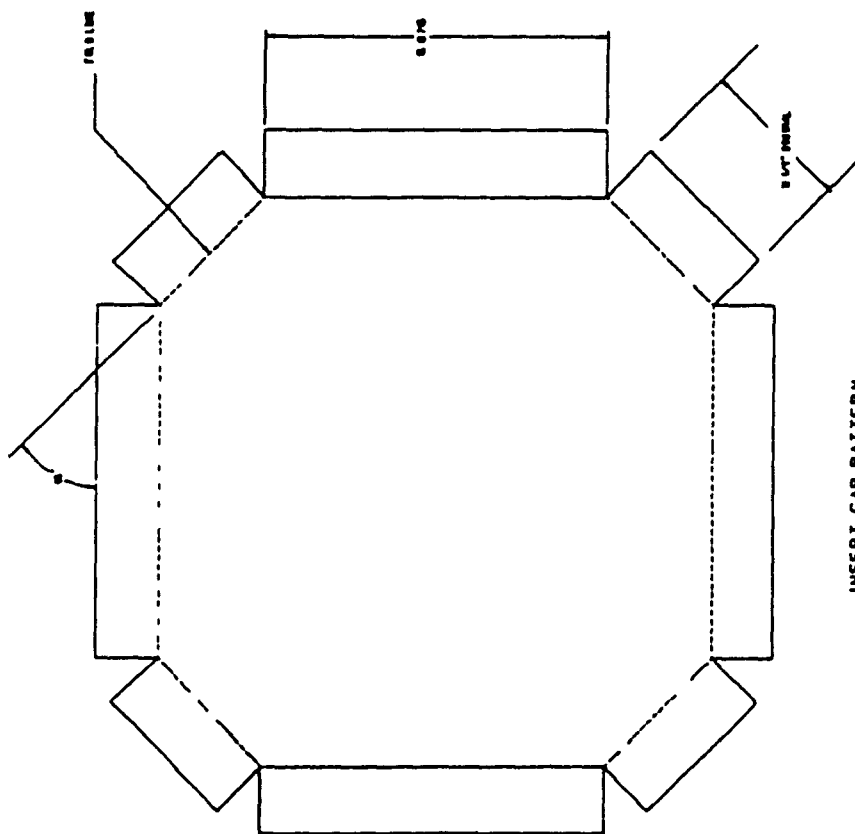
★FORM 000 6.

APPENDIX TO STANDARD NO SX-222  
INSPECTION FORM  
(TRIPLE WALL BOX OUTER CAP)

			DRAWING NUMBER		SERIAL NUMBER	
ITEM NO			SPECIFICATION			
			INSPECTION ENTRY			
1			Dimensions per paragraph 7 1			
2			Slots per paragraph 7			
3			Scoring per paragraph 7 2			
4			Thickness per paragraph 6 1			
5			Burst strength per paragraph 6 1			
6			Correct material and fluting per paragraph 6.1 and 6 2			
7			Good workmanship per paragraph 5			
8			Construction requirements per Section 7.2			
9			Packaging and Shipping requirements per paragraph 10			
<p>NOTE This form lists "PRELIMINARY DETERMINATION" required prior to the first use of any package as specified by DOE Order 5480 1, CH. III</p>						
<p>USE ABOVE SPACE FOR REMARKS</p>						
OTHER IDENTIFYING NUMBERS, IF ANY						
<p>DIMENSIONAL INSPECTION</p> <p>INSPECTED BY DATE INSPECTED SHIFT</p> <p>ACCEPTED REJECTED BY DATE</p> <p>RADIOGRAPHIC INSPECTION</p> <p>ACCEPTED REJECTED RADIOGRAPHIC REPT NO DATE</p> <p>MATERIAL CERTIFICATION</p> <p>ACCEPTED REJECTED BY DATE</p> <p>OVERALL ACCEPTANCE</p> <p>ACCEPTED REJECTED BY DATE</p> <p>ILLUSTRATION</p>						
<p>KEY DESCRIPTION DATE</p> <p>APPROVALS TITLE</p> <p>DATE TOTAL SHEETS SIZE DRAWING NUMBER</p> <p>NUMBER SHEET ISSUE</p>						







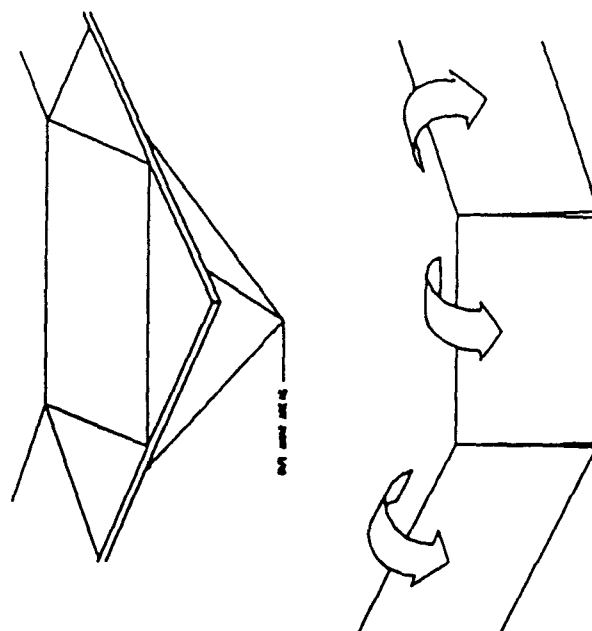
**INSERT CAP PATTERN**

FOUR D INSERT CAP

**ROCKY FLATS PLANT STD NO SX 222 ATTACHMENT**

CONTROLLED DRAWING  
REV 01 5/22

**FOLD SEQUENCE**



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13</																																																																																							



Rockwell International

Rocky Flats Plant  
P.O. Box 464  
Golden, Colorado 80401

STANDARD FOR  
CORRUGATED METAL WASTE CONTAINER  
(STEEL BOX)

D	Change term vendor to supplier in Para. 3.6.1, 3.6.2, 4.2, 4.2.1, 4.2.2 & 4.4. Revise all 4 inspection forms. Dwg. Rev. "H"	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	6/14/88	L.B.	<i>[Signature]</i>	<i>[Signature]</i>
C	Eliminated vent plug and antiseize Per DCR X-231-2	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	6/13/86	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>
B	Revised Para's 3.2, 3.4, 3.6, 4.3 and added Para's 3.7 & 3.8 per DCR X-231-1 26583-1--4	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	11-19-84	JNC	<i>[Signature]</i>	<i>[Signature]</i>
A	ORIGINAL ISSUE	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	8/23/88	J.N.C.	<i>[Signature]</i>	<i>[Signature]</i>
ISSUE	DESCRIPTION	S A	PQE	TRAF	W O.	DATE	BY	APPR'D CLASS REVIEW
								DESIGN ENGRG DEPT.

Revision to this standard shall be accomplished by Design Engineering Process Equipment Design Section and approved by. Safety Analysis, Procurement Quality Engineering, Traffic, and Waste Operations

ROCKY FLATS PLANT STD NO. SX-231

FE-1058(161)-3-Sad

11/84

STANDARD  
FOR  
CORRUGATED METAL WASTE CONTAINER  
(steel box)

1. GENERAL

1.1 SCOPE

This standard and Rockwell Drawings D-26383-1 through -4 shall give the minimum dimensional and material requirements for a corrugated metal waste container. The Buyer will supply tooling, dies, and fixturing as listed below:

2. REFERENCE

<u>Description</u>	<u>Drawing No. or Standard No.</u>
Rocky Flats Plant standard -- Standard for Carbon Steel Welding	SM-105
ASME Boiler and Pressure Vessel Code	Section IX
ASTM--Air Leak Testing Procedures	E515
Corrugated Metal Waste Container Assembly 1	D-26383-1
Corrugated Metal Waste Container Assembly 2	D-26383-2
Corrugated Metal Waste Container Assembly 3	D-26383-3
Corrugated Metal Waste Container Assembly 4	D-26383-4
<u>Electronic Metal Products Tooling Drawings</u>	
Box Side Corrugations DIE	2040-101
Lid and Base Corrugations DIE	2040-102
2-3/4 Radius DIE	2040-103
Notch Cutting DIE	2040-104
Manufacturer's Stamp DIE	2040-105
Bend Tooling	2040-106
Weld Fixture	2040-107

3. REQUIREMENTS

3.1 CONSTRUCTION

Vertical weld seams shall not be located within the corner radii of the box body. The lid and bottom sections shall be constructed of one-piece steel. Refer to the respective Rockwell drawings for the correct number of corrugations and spacing.

### 3.2 WELD REQUIREMENTS

3.2.1 The Rocky Flats Plant Standard SM-105, Standard for Carbon Steel Welding, shall be used.

NOTE: Paragraph 4.2 shall be changed for this standard to include the metal-arc welding of carbon steel 14-gage (0.0747 in.) in thickness.

3.2.2 Welding shall be performed by welders qualified to American Society for Testing Materials (ASTM), American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section IX, or American Welding Society (AWS) procedures for carbon steel welding.

#### 3.2.3 Exterior Weld Requirements

All exterior welds shall be continuous and air leak-tight to meet leak testing requirements per paragraph 4.3 of this standard.

#### 3.2.4 Inferior Weld Requirements

The interior vertical seam shall be welded at each point where the corrugations have been pressed in. Each weld shall cover the full outer radius of each corrugation. (See Section A-A.) The free end of the roll flange shall not be welded to the side wall. (See Section A-A.) Bottom shall be skipped-welded internally, 2-inch minimum weld, and 4-inch maximum skip.

### 3.3 WELD INSPECTION

Welds shall be visually examined for cracks, holes, or other deficiencies. Continuous welds shall be sound with no detectable flaws or inclusions. If visual inspection indicates poor weld quality, the Buyer may specify dye-penetrant inspection.

### 3.4 CLEANING

Slag, dirt, trash, and weld wires shall be removed from the container. All welds shall be cleaned, wire-brushed, and weld spatter, weld-wire, or other residue removed.

3.4.2 Extreme caution should be exercised such that there is no reduction of the base metal thickness. Thinning below minimum gage thickness (0.065) is cause for rejection.

### 3.5 PIPE COUPLING REQUIREMENTS

The 3/4-inch threaded coupling is required per the attached drawing; however, no antiseize material or plug are required.

### 3.6 FINISH--EXTERIOR AND INTERIOR

3.6.1 Following are requirements for paints for use on the steel boxes. The Supplier has the option of applying the paint of its choice as long as it meets these requirements.

3.6.2 Supplier shall submit sample coupons of proposed paint, before bid is awarded, using the same process that will be used to paint the boxes. Buyer will test the samples to determine if the paint and process are acceptable. These coupons will be used as a standard to determine paint finish quality on production boxes. Paint finish below the quality and appearance shown on the test coupons will be cause for rejection of boxes.

<u>Item</u>	<u>Test Procedure/Conditions</u>	<u>Requirements</u>
Color	ASTM D-1535-80	Munsell N 9.00 or whiter
Hiding Power	Visual Inspection	Adequate top coating must be applied to prevent visual detection of substrate or undercoats
Paint Quality	Current Manufacturing	One coat minimum of high-quality paint, white 4.5 mil (0.045 inch) thick average over interior and exterior surface area
Adhesion	ASTM D-3359-78	Rating per Method A = 5A Rating per Method B = 5B

### 3.7 MASKING FINAL WELD AREAS

A vinyl tape, capable of withstanding three (3) years of outdoor exposure (Scotch brand No. 472 or equivalent), shall be used to mask off the areas shown in the field of drawing. Tape shall not be torn or scratched such that bare metal will be exposed to the atmosphere. Tape perimeter of box and lid edges. (See Drawing Taping Detail.)

### 3.8 PAINTING LIFTING LOOP LOCATIONS

The inside of each lifting loop and the area that it will cover on the box shall be painted before the lifting loops are attached. Weld areas are to be kept free of paint.

## 4. QUALITY PROVISIONS

### 4.1 ACCEPTANCE

4.1.1 The Buyer's acceptance will be based on visual, dimensional, and functional inspection and dye-penetrant test on a representative sample from each lot of steel boxes supplied. Buyer reserves the right to perform 100% inspections at any time. Acceptance will include those items listed on the inspection form that is a part of this specification. Receiving inspection will include, but not be limited to, the following:

- 1) Gage of metal and weld requirements and appearance
- 2) Permanent markings

- 3) Container dimensions
- 4) Constructions and locations details of all fittings
- 5) Lid and bottom panel construction details
- 6) Leak test and other tests as required
- 7) Paint and taping requirements
- 8) General cleaning requirements

4.1.2 The acceptance quality level (AQL) will be those stated in the Buyer's Quality Inspection Directive (QID), a copy of which may be obtained upon request.

#### 4.2 QUALITY SURVEYS AND SOURCE ACCEPTANCE (SA)

4.2.1 The Buyer will conduct periodic quality surveys of the Supplier's operation to ensure conformance to this specification. Techniques or processes that the Supplier considers proprietary information may be exempt from the survey.

4.2.2 Procurement documents for the corrugated metal waste container may specify "source acceptance" (SA), which consists of Rockwell personnel monitoring the Supplier's production of the containers. This is to verify that the Supplier's process and inspections are producing containers that meet the requirements of this standard. Rockwell personnel will inspect preproduced or purchased containers before acceptance is made. A representative sample of each lot will be monitored for dimensional tolerances, visual defects, and the results of testing requirements. If this observation reflects inadequate specification conformance, per Standard SX-231 requirements, Rockwell personnel may request corrective actions be taken by the Supplier to rectify this condition. Shipping and handling methods will be observed to meet Rockwell standard requirements. This SA inspection does not release the Supplier of the responsibility of specification compliance in any of the above areas.

#### 4.3 LEAK TESTING

Each box shall be certified by the manufacturer as being air leak-tight per ASTM E515 (latest revision). The liquid applications techniques shall be performed using air with a minimum pressure differential of 0.5 psi. An industrial leak-test solution shall be used as the leak indicator.

#### 4.4 SUPPLIER'S CERTIFICATION

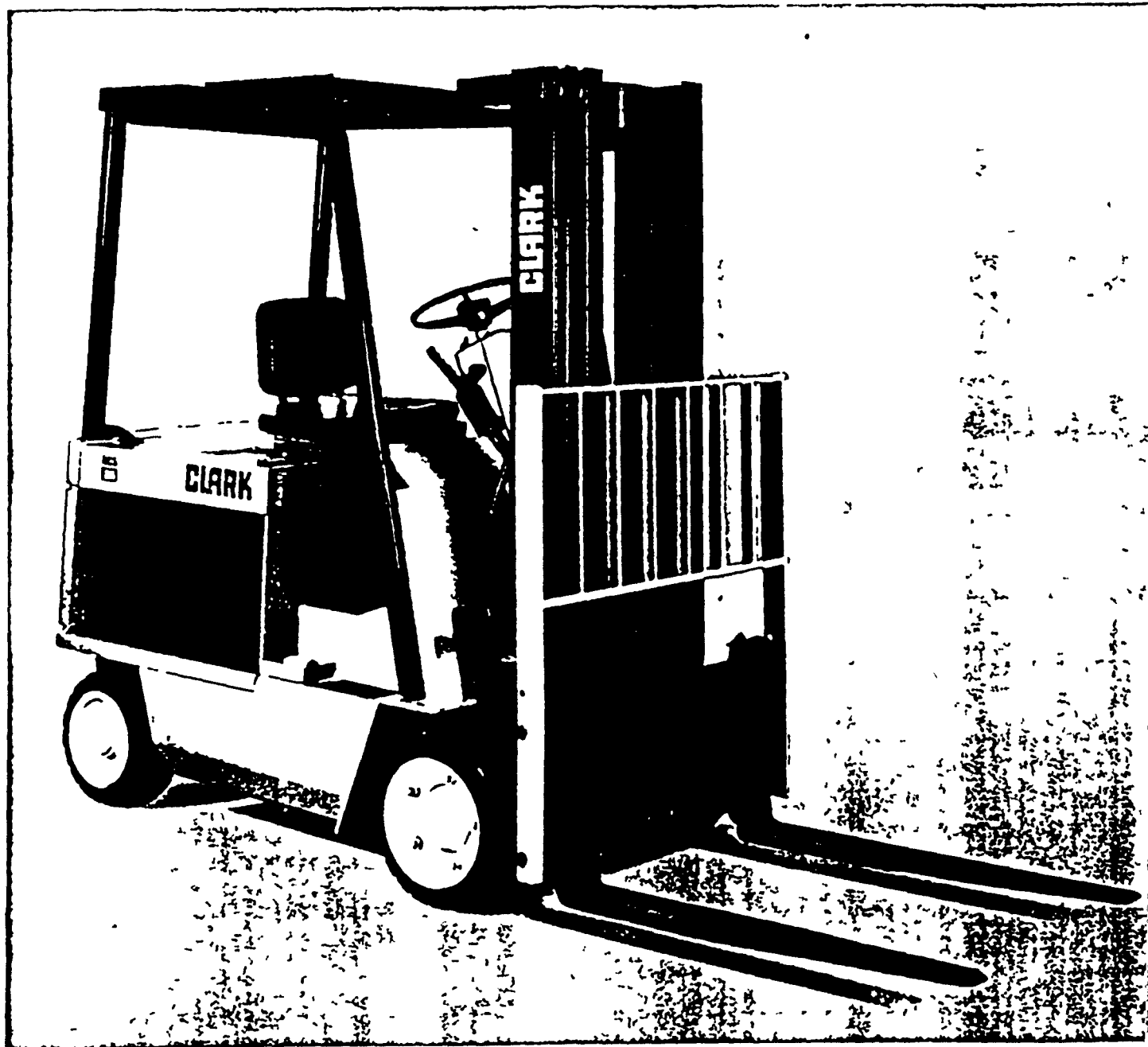
Each lot of steel boxes furnished shall be accomplished by the Supplier's certification of the materials used and the results of tests and inspection performed per Rockwell Quality Assurance Code specified on purchase order.

# CLARK<sup>®</sup> ECS Series

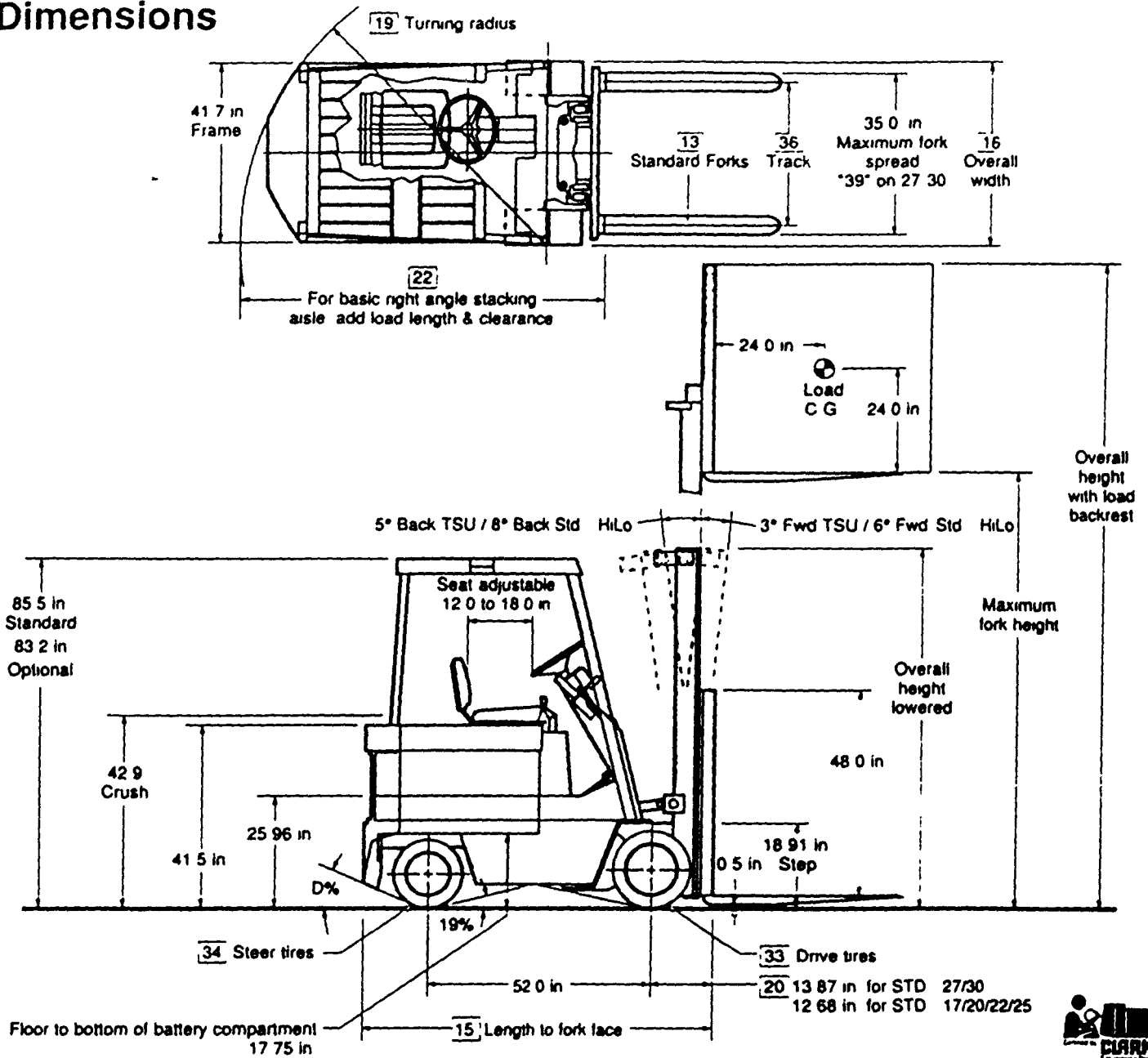
Electric  
Cushion Tire Lift Trucks

ECS 17/20/22/25/27/30  
36/48 Volt

Rated Capacity: 3500/4000/4500/5000/5500/6000 lbs  
1750/2000/2250/2500/2750/3000 kg



# Dimensions



Standard Battery Compartment size 38.9 in W x 30.4 in L x 23.15 in H

Battery without cover termination A 18" Connector 6320

## Optional Battery Compartment Information

38.9 in W x 27.5 in L x 23.15 in H							38.9 in W x 34.4 in L x 23.15 in H						
	ECS 17	ECS 20	ECS 22	ECS 25	ECS 27	ECS 30		ECS 17	ECS 20	ECS 22	ECS 25	ECS 27	ECS 30
15	77.09	77.09	77.52	78.67	-	-	15	83.99	83.99	83.99	83.99	85.57	86.62
19	69.46	69.46	69.79	70.79	-	-	19	75.68	75.68	75.68	75.68	77.14	78.12
22	83.26	83.26	83.64	84.69	-	-	22	89.58	89.58	89.58	89.58	91.04	92.02
30	7979	8279	8764	9324	-	-	30	8749	8749	8799	9149	9802	10151
31	10099	11014	11879	12749	-	-	31	9939	10789	11654	12559	13543	14308
	1330	1215	1335	1525	-	-		2260	1910	1605	1540	1758	1843
	4124	4189	4199	4214	-	-		3964	3964	3974	4024	4128	4038
	3805	4090	4515	5060	-	-		4735	4735	4775	5075	5675	6113
42	38.2	38.2	38.2	38.2	-	-	42	48.6	48.6	48.6	48.6	48.6	48.6
43	1900	2200	2400	2700	-	-	43	2600	2600	2650	3000	2950	3000
D	60%	60%	58%	55%	-	-	D	31%	31%	31%	31%	31%	31%



# CLARK <sup>TM</sup> Series

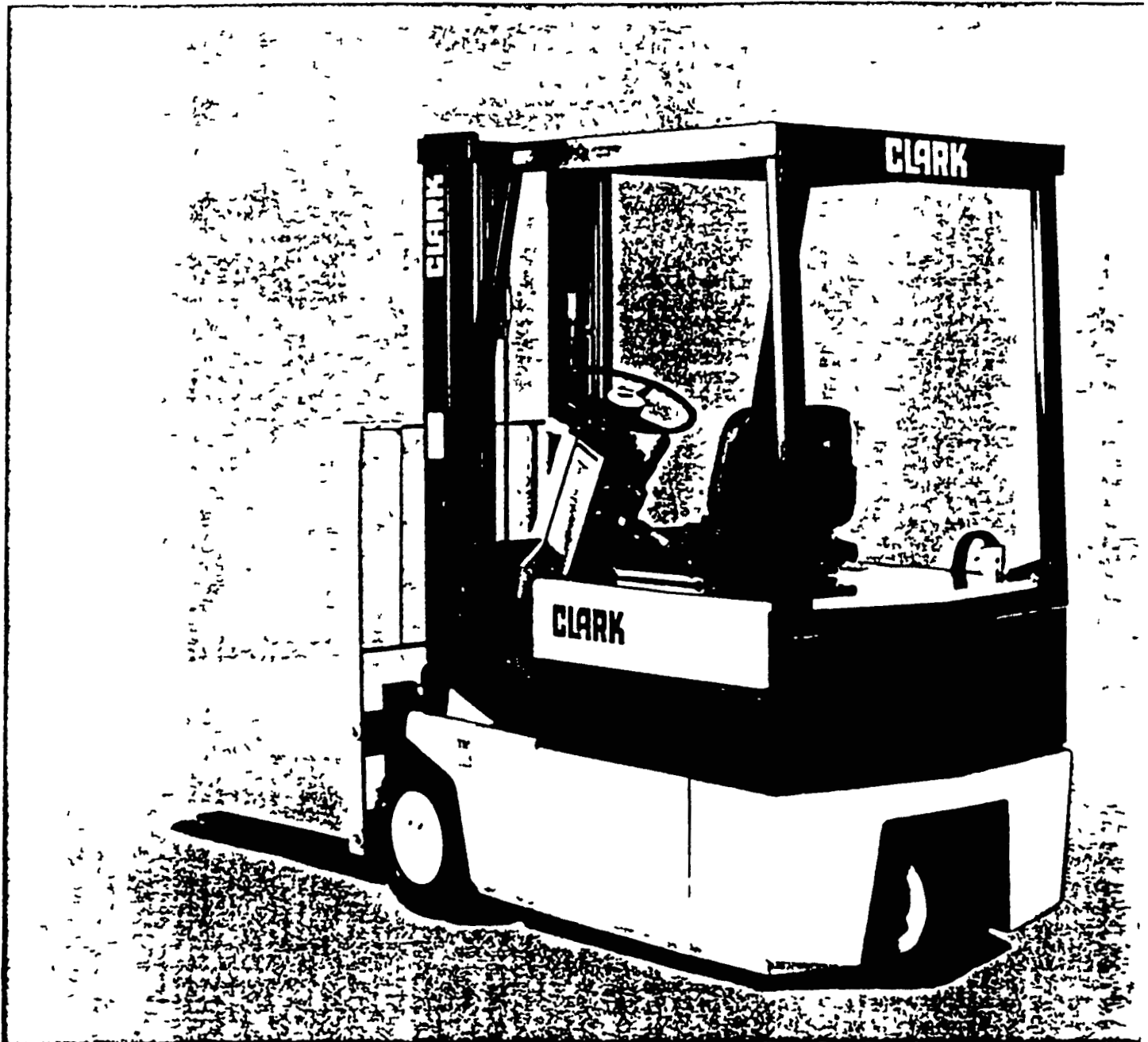
---

Electric Tri-wheel  
Multi-tire\* Lift Trucks

TM12/15S/15/17/20/22/25  
36 Volt

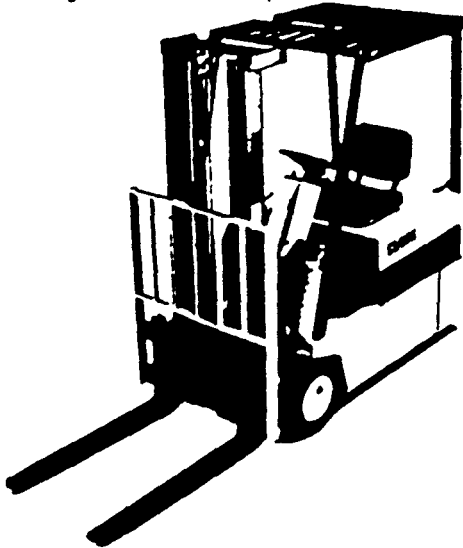
\*Cushion or pneumatic

Rated Capacity: 2,500/3,000/3,500/4,000/4,500/5,000 lbs  
1250/1500/1750/1815/2250/2500 kg



# Product Description

Clark TM Series electric tri wheel lift trucks are selected for excellent maneuverability, low height, clean operation and flexibility of using either cushion or pneumatic tires.



## Operator Comfort/Convenience

- Non polluting operation
- Low sound emission
- Hydrostatic power steering is standard
- Responsive pre reduction disc brakes
- Adjustable seat, smooth vinyl covering for easy on/off movement, thick cushion, deeply contoured
- Large, palm-size control knobs
- International symbols identify functions

Compartment design allows operator to step on or off from either side. Exposed surfaces are smooth and rounded to help prevent snagging or injury.

The TM 12/15S/15/17/20/22/25 is equipped with a seatbelt which is designed to protect the operator in the event of truck overturn. Forward neutral reverse directional control knob is mounted directly below the 15-inch diameter handwheel to allow left hand fingertip operation. Separate lift and lower, tilt and auxiliary controls are at natural right hand position on the seat deck. Battery quick disconnect is on the seat deck within easy right hand reach. Key switch, hour meter and battery charge indicator are standard equipment and fully visible on the steering pylon.

Overhead guard has longitudinal bars to improve forward visibility, finished in flat black to help reduce glare.

Low cowl height and narrow pylon increase operator's view of forward floor level activity.

Overhead guard meets or exceeds ANSI B56.1 safety standards.

## Motors

Drive motors and hydraulic lift pump motor are ventilated and fan cooled. A radial fan providing equal air flow in forward or reverse, continuously forces outside air through the ventilated motor casings, removing heat for extended motor life.

Steer pump motor is permanent magnet type selected for its long lasting, low maintenance characteristics.

## Electrical Controls

- Solid state speed control has minimum wearing parts
- General Electric EV100 SCR (silicon controlled rectifier) drive motor control
- High available torque control in the SCR range
- SCR protected by thermal limit, current limit and pulse monitoring trip circuit
- Reverse polarity protection prevents damage to control

The SCR drive control provides infinitely variable speeds in forward and reverse. Higher current limit setting and greater thermal capacity increase truck's ability to respond under load, climb ramps and meet other power demands. Thermal and current sensing prevents damage to the SCR control if design limits are exceeded. Tips on electrical contactors are anti weld type. The complete system, including contactors, is mounted on the counterweight for ease of access.

## Drive Line

- Dual plug in drive motors
  - Spiral bevel input gears
- Plug in drive motors with heavy mounting flanges mate the splined armature shafts directly to the respective axle assemblies for positive alignment and improved heat dissipation. Oil ports from the differentials provide lubrication to the couplings. Clark dual axle and motor assemblies multiply torque 23:386 to 1 through final gear reduction to the drive wheels. The assemblies incorporate smooth quiet operating spiral bevel gears.

## Brakes

- Dual hydraulic disc type
- Protected mounting location
- Responsive pre-reduction design
- Self adjusting

Disc type service and parking brakes are mounted inboard at both left and right drive units, working through the gear train from an intermediate shaft. This pre-reduction design multiplies braking torque 4.4 to 1 and provides smooth, responsive braking with reduced pedal effort. Parking brake is hand-operated cable-actuated working on a separate set of pads acting on the service brake discs.

## Hydraulic System

- Hydraulic valve has interchangeable flow control cartridges for precise volume regulation
- Main hydraulic pump operates quietly
- Continuous fluid filtration
- Heat preventive plumbing
- O-ring faced seals at all high pressure points

Lift, tilt and auxiliary control levers are closely coupled to the hydraulic valve, eliminating complex linkage and providing excellent response.

Continuous fluid filtration within the power steering system and an extremely fine 25 micron return line filter combine to more than double the system's filtering efficiency. A suction line screen protects the system from particles entering through the sump tank. A cleanable 10 micron filler cap/breather serves as the oil fill cap and protects the system from airborne contamination. New tilt cylinder design allows in truck packing replacement. Tubing is cadmium plated to reduce corrosion.

## Steering

- Hydrostatic power steering is standard
- Integral power steering pump and motor
- Free wheeling of inside drive wheel on turns exceeding 45° provides high maneuverability

Steer axle trunnion uses two sets of tapered roller bearings for smooth, low effort steering. Hydrostatic power steering control valve and steering cylinder provide responsive, near effortless control with no handwheel kick back.

## Upright Assemblies

- Standard, Hi Lo or Triple Stage uprights
  - All roller design lowers friction, reduces energy consumption
  - Quick shim roller adjustment
  - Class II truck carriage
- All Clark uprights feature interlocking I beam and channel rails reinforced with heavy tie bars, four canted variable retainment upright rollers with canted load rollers on the upright carriage, upright tilt cylinders, compression locked to yoke for positive adjustment, chrome plated cylinder rods, greasable upright mountings, hydraulic counterbalance valve in tilt circuit, load lowering control valve that regulates lowering speed in relation to load weight, hook mounted forks, upset forged for full section strength at fork heel.

## Features and Options

- Standard equipment: power steering, seat belt, overhead guard, 48-in. load backrest, electric horn, finish is high visibility Clark green and black with white wheels, warning labels, operator's manual attached to truck.

## ANSI and Insurance Classifications

Standard truck meets all applicable mandatory requirements of Part II — ANSI B56.1 1969-1975 Safety Standard for Powered Industrial Trucks and Underwriters Laboratories requirements as to fire and electrical shock hazard only for 'E' classification. For further information, contact a Clark representative.

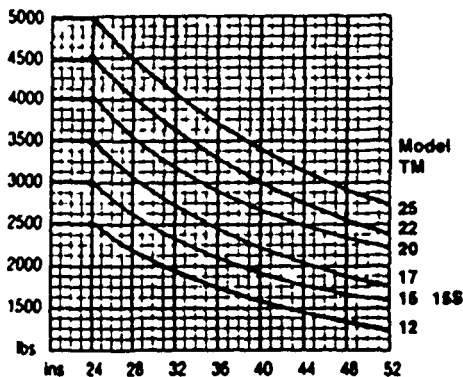
# Truck Capacities

Note Capacities shown are computed with upright in vertical position. Load centers are determined from top and front face of forks. Capacities are based on a 48-inch cube load configuration with the center of gravity (C.G.) at the true center of the cube and standard forks.

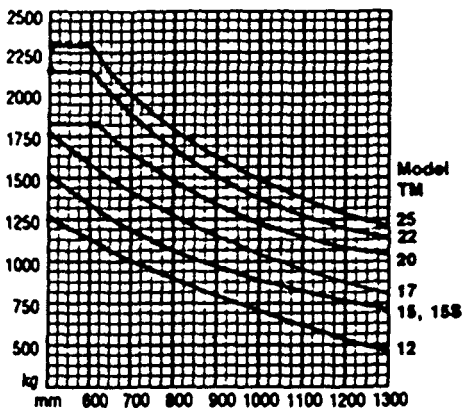
Truck capacities with upright in forward tilt position will be less. Long forks and unusually wide or tall loads may also reduce capacity. Contact Clark representative for capacity information on irregular loads.

Specific capacities are shown on truck nameplates.

Capacity - pounds  
Load Center - inches



Capacity - kilograms  
Load Center - millimeters



## Notes

Performance may vary +5% and -10% due to motor and system efficiency tolerance. The performance shown represents nominal values obtained under typical operating conditions.

Clark products and specifications are subject to change without notice.

Clark is a registered trademark of Clark Equipment Company.

©Copyright Clark Equipment Company 1988

## General Data

### Upright Table (in )

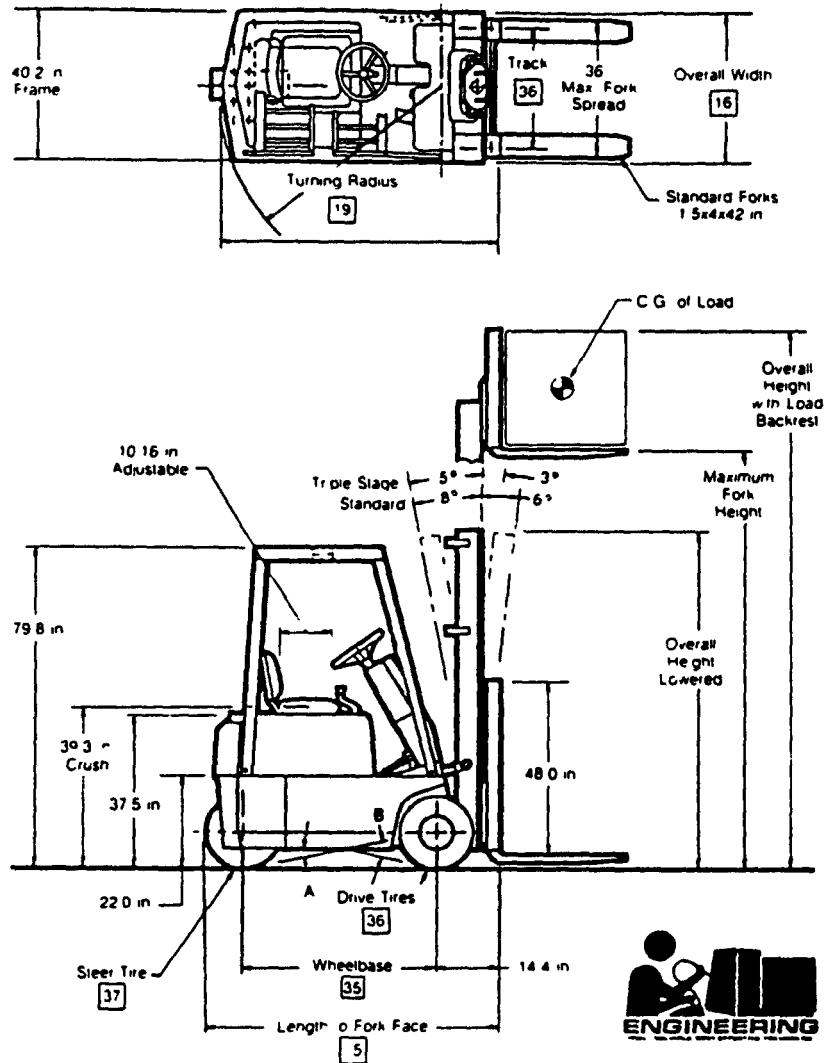
Maximum Fork Height	Overall Height Lowered	Free Lift
<b>Standard</b>		
110	77	4 8
122	83	4 8
145	95	4 8
<b>Hi-Lo</b>		
*116	77	53
128	83	59
<b>Triple Stage</b>		
*170	77	57
188	83	63

Indicates preferred standard sizes

### Battery Compartment Sizes (in )

Width	Length	Height
<b>TM12/15S</b>		
38 8 in	13 75 in	31 0 in
<b>TM15/17/20/22/25</b>		
38 8 in	20 5 in	31 0

## Dimensions



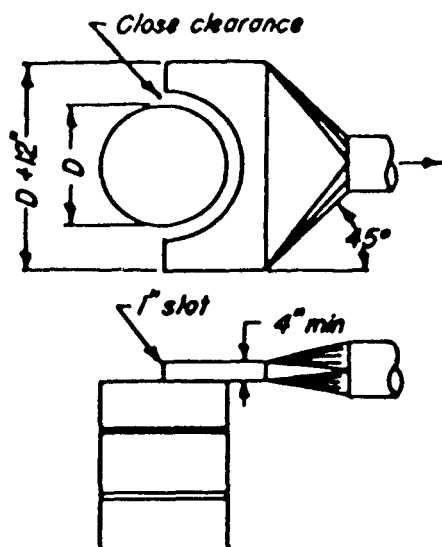
For data see corresponding number in chart on previous page

Model	A	B
TM 12	15 7	31 4
TM 15S	14 8	39 6
TM 15	13 7	27 4
TM 17	12 9	25 8
TM 20	12 1	24 2
TM 22	11 5	23 0
TM 25	10 8	21 6

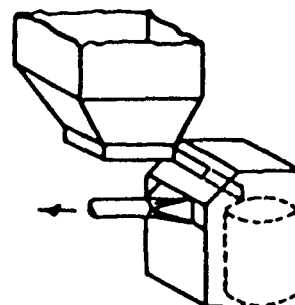
JEAN SUMMERS  
SOUTHLINE EQUIPMENT COMPANY  
700 WEST CAVALCADE  
HOUSTON, TEXAS 77009  
(713) 869-6801

**CLARK** Material Handling Company

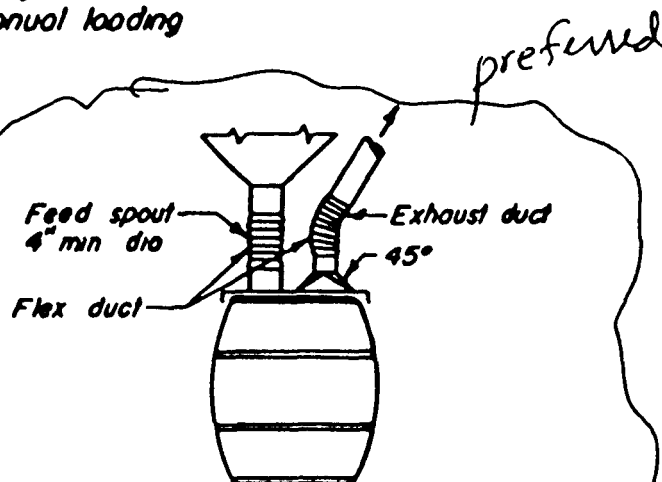
333 West Vine Street  
Lexington KY 40507 1640



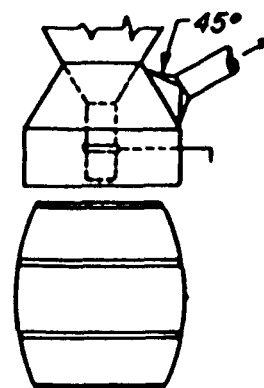
$Q = 100 \text{ cfm/sq ft barrel top min}$   
 Duct velocity = 3500 minimum  
 Entry loss =  $0.25 \text{ VP} + 178 \text{ slot VP}$   
 Manual loading



$Q = 150 \text{ cfm/sq ft open face area}$   
 Duct velocity = 3500 fpm minimum  
 Entry loss =  $0.25 \text{ VP}$  for 45° taper



$Q = 50 \text{ cfm} \times \text{drum dia (ft)}$  for weighted lid  
 $150 \text{ cfm} \times \text{drum dia (ft)}$  for loose lid  
 Duct velocity = 3500 fpm minimum  
 Entry loss =  $0.25 \text{ VP}$



$Q = 300-400 \text{ cfm}$   
 Duct velocity = 3500 fpm min  
 Entry loss =  $0.25 \text{ VP}$

AMERICAN CONFERENCE OF  
GOVERNMENTAL INDUSTRIAL HYGIENISTS

BARREL FILLING

DATE

1-64

VS-303

Pour Station Ventilation Hoods  
 from Keith Anderson May 29, 1991

# EXHIBIT "O"

TABLE 2 ESTIMATED QUANTITIES FROM WESTON REPORT DATA  
(Weston Solar Pond Sampling Report, July, 1991)

23-Aug-91

POND	SLUDGE* (cu ft)	LIQUID* (cu ft)	SOLIDS (tons)	LIQUID (tons)	SLUDGE % SOLIDS	SG* SLUDGE	SLURRY % SOLIDS	SG* SLURRY	SLUDGE (cu yd)	LIQUID (cu yd)
207A	112	15,454	1 04	481 9	11 2	1 075	0 21	1 001	4 1	572 4
207B-S	21,218	97,499	85 1	3,671 9	11 9	1 080	2 27	1 014	785 9	3,611 1
207B-C	20,669	98,048	58 6	3,681 8	8 6	1 057	1 57	1 010	765 5	3,631 4
207B-N	17,806	129,694	153 4	4,544 1	23 6	1 172	3 27	1 021	659 5	4,803 5
207C	25,810	24,745	584 7	1,356 7	50 0	1 452	30 12	1 231	955 9	916 5
TOTALS	85,615	365,440	882 8	13,736 4	19 8	1 141	6 04	1 039	3,170 9	13,534 8

\* MEMOS JHT to WCH 8/13/91 and 8/14/91

\*\* BASED ON S G SOLI 2 65  
LIQUIDS 1 00

# EXHIBIT "P"

TABLE 1 RELATIONSHIPS BETWEEN PROCESS INPUTS AND PONDCEMENT OUTPUT  
3:1 MAXIMUM AGGREGATE/CEMENT RATIO

23 Aug 91

INPUT SLURRY WEIGHT%	S G OF SLURRY	TPH SOLIDS	TPH LIQUID	5.20 GAL H <sub>2</sub> O/SK CEMENT (0.500 TONS H <sub>2</sub> O/TON DRY SOLIDS) TPH H <sub>2</sub> O	FOR 20 TPH PRODUCT TPH CEMENT	TPH PRODUCT	LBS/FT <sup>3</sup>	1/2-CRATES/HR	V OUT/IN
0.0	1.000	0.00	6.67	0.00	13.33	20.00	121.14	9.26	1.54
1.0	1.006	0.07	6.67	0.00	13.27	20.00	121.05	9.26	1.54
2.0	1.013	0.14	6.67	0.00	12.91	19.72	118.72	9.31	1.54
3.0	1.020	0.22	6.67	0.00	12.83	19.71	118.60	9.32	1.53
4.0	1.027	0.29	6.67	0.00	12.75	19.71	118.48	9.33	1.53
5.0	1.032	0.35	6.67	0.00	12.98	20.00	120.67	9.29	1.52
6.0	1.039	0.43	6.67	0.00	12.91	20.00	120.57	9.30	1.5
7.0	1.050	0.55	6.67	0.00	12.16	19.37	115.48	9.41	1.52
8.0	1.060	0.67	6.67	0.00	11.67	19.00	112.40	9.48	1.52
9.0	1.071	0.80	6.67	0.00	11.11	18.58	108.92	9.56	1.52
10.0	1.066	0.74	6.67	0.00	12.59	20.00	120.14	9.33	1.49
15.0	1.103	1.18	6.67	0.00	12.16	20.00	119.55	9.38	1.47
20.0	1.142	1.67	6.67	0.00	11.67	20.00	118.89	9.43	1.47
25.0	1.184	2.22	6.67	0.00	11.11	20.00	118.14	9.49	1.41
30.0	1.230	2.86	6.67	0.00	10.48	20.00	117.29	9.56	1.37
35.0	1.279	3.59	6.67	0.00	9.74	20.00	116.30	9.64	1.34
40.0	1.332	4.44	6.67	0.00	8.89	20.00	115.15	9.74	1.30
42.5	1.360	4.93	6.67	0.00	8.41	20.00	114.50	9.79	1.28
45.0	1.389	5.45	6.67	0.00	7.88	20.00	113.79	9.86	1.26
47.5	1.420	6.03	6.67	0.00	7.30	20.00	113.01	9.92	1.23
50.0	1.452	6.67	6.67	0.00	6.67	20.00	112.15	10.00	1.21
52.5	1.486	7.37	6.67	0.00	5.97	20.00	111.21	10.08	1.19
55.0	1.521	8.15	6.67	0.00	5.19	20.00	110.16	10.18	1.16
57.5	1.558	9.02	6.67	0.00	4.31	20.00	108.98	10.29	1.14
60.0	1.596	10.00	6.67	0.00	3.33	20.00	107.66	10.42	1.11
65.0	1.680	10.00	5.39	1.28	3.33	20.00	107.66	10.42	1.26
70.0	1.773	10.00	4.29	2.38	3.33	20.00	107.66	10.42	1.44
75.0	1.876	10.00	3.33	3.33	3.33	20.00	107.66	10.42	1.63
80.0	1.992	10.00	2.50	4.17	3.33	20.00	107.66	10.42	1.84
85.0	2.124	10.00	1.77	4.90	3.33	20.00	107.66	10.42	2.03
90.0	2.275	10.00	1.11	5.56	3.33	20.00	107.66	10.42	2.37
95.0	2.448	10.00	0.53	6.14	3.33	20.00	107.66	10.42	2.69
100.0	2.650	10.00	0.00	6.67	3.33	20.00	107.66	10.42	3.07

BASED ON S G SOLIDS OF 2.65 LIQUID OF 1.00 PORTLAND CEMENT AT 3.13  
ABOUT 35.67 FT<sup>3</sup>/1/2-CRATE

DEFINITIONS. POND SLUDGE - WET SETTLED SOLIDS WITH INTERSTITIAL WATER ONLY  
POND SLURRY - UNIFORM MIXTURE OF POND SLUDGE AND FREE WATER  
POND SOLIDS DRY SOLIDS IN POND SLUDGE

# EXHIBIT "Q"

## INTEROFFICE MEMORANDUM

DATE. August 27, 1991

File No : 835.1

TO John Zak

FROM: Larry O'Quinn *LO*

SUBJECT. Rocky Flats Solar Pond/Pondcrete  
Stabilization Project  
Brown & Root Job No. JR-1198

REFERENCE. Stack Height Analysis for Half Crates  
of Stabilized Waste

### I INTRODUCTION

The purpose of this memo is to inform you about the status of the engineering work done to determine the maximum allowable stack height for half crates of stabilized waste. It is imperative that the half crates be stacked at an optimum height to allow storage up to the permitted volume of each pad. The design parameters investigated include (1) allowable loads for the existing paving/soil, (2) crush strength of the half crates, (3) seismic loading conditions, and (4) fork truck lift height capabilities.



## II

### EXECUTIVE SUMMARY

#### A. Conclusions

##### 1. Paving/Soil Bearing Considerations

- a The following conclusions are based on an estimate allowable paving/soil loading of 1500 pounds per square foot (PSF), which was obtained by phone from Leon Collins of EG&G. The geotechnical report for the 750 and 940 pads was not available for analysis at this time.
- b. The maximum allowable stack height without cribbing is one (1) half crate high. This conclusion meets the requirements of restricting the maximum paving/soil loads to about 1500 PSF. However it does not fit observations of current stacking arrangements. Half crates are now stacked four (4) high with minimum deformation (1/16 to 1/8 inch) of the paving. This can be interpreted to mean the paving/soil can withstand higher loads than 1500 PSF without significant damage.
- c The maximum allowable stack height, while limiting paving/soil loading to 1500 PSF, is ten (10) half crates high with 12 inches of cribbing.

2 Half Crate Crush Strength Considerations

- a. Previous half crate crush strength test were conducted using a loading and support configuration that is not the same as will be experienced when stabilized wastes are stored in half crates on the 750 and 904 pads.
- b. Similar half crate crush strength test with the correct loading and support configuration should confirm the mode of failure and crush strength of the half crates under conditions similar to those encountered during storage on the 750 and 904 pads We believe these tests will confirm our believe that the half crates will be able to with stand stack heights to the limit of the paving/soil bearing capacity

3 Seismic Loading Considerations

- a The project plan requires HNUS must comply with seismic requirements as applicable Rocky Flats Plant Seismic Design Criteria requires seismic analysis be done by methods established in the "Uniform Building Code" (UBC), but with special correction factors applied to relate to degree of hazard.

- b. The UBC places the Rocky Flats Plant in a seismic Zone 1 classification
- c. The UBC requires lateral restraints on all non-rigid equipment should failure of lateral restraints result in a life hazard situation. Friction from gravity loading cannot be considered as restraint.
- d. We conclude stacks of stabilized waste stored in half crates require lateral restraints when over one stack high. Therefore seismic loading does not effect the allowable stack height because restraints are required in any case  
Note The existing half crates are stacked four high without restraints This may mean the Rocky Flats Engineering Department does not require the design of half crate storage to meet their seismic design criteria

#### 4 Fork Truck Lift Height Considerations

- a. The existing fork trucks can stack up to six (6) half crates high
- b. New fork trucks could be purchased to allow stacking of half crates up to the maximum allowable of ten (10)

half crates high.

B. Recommendations

1. Provide copies of the geotechnical report for pads 750 and 904. The results of the geotechnical report could allow for higher stacks or require less cribbing to obtain the same stacking results.
2. Run new half crate crush strength tests to confirm the strength of half crates under the loading/support conditions that will be encountered during storage of the half crates on the 750 and 904 pads
3. For Waste Inventory Storage design limit the storage of half crates to six (6) high where possible, while keeping in mind that they can be stored ten (10) high if necessary. Also allow room for lateral restraints
4. Have EG&G confirm that storage of half crates must meet the same seismic design requirements as equipment and structures

III. PAVING/SOIL BEARING CONSIDERATIONS

The allowable paving/soil bearing pressure has been estimated as approximately 1500 pounds PSF. This value was obtained from Leon Collins of EG&G by telephone and has not been confirmed by the geotechnical report documentation. The allowable value of 1500 pounds per square foot has been acknowledged by our structural engineer as a reasonable allowable load for asphalt paving on soil design where no geotechnical report data is available. A typical allowable load range for asphalt paving on soil is 1000 to 2000 PSF

Half crates have a maximum permitted weight of 4500 pounds each, which has been established by EG&G to safely match the load ratings of the existing fork trucks. The dimensions of a half crate are provided in Figure II 1.

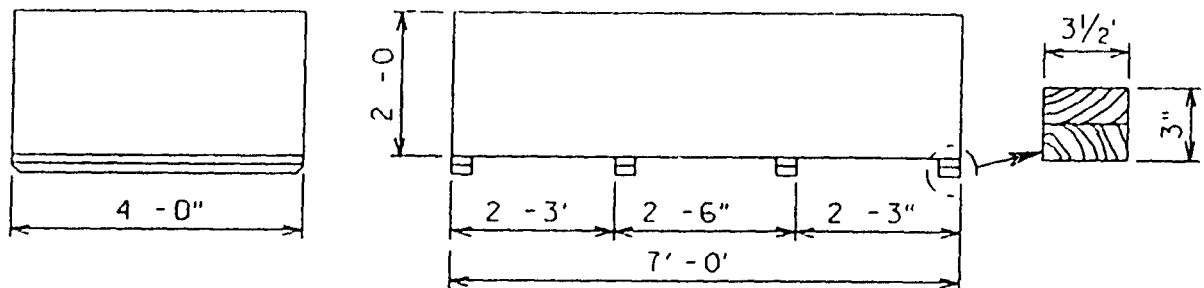
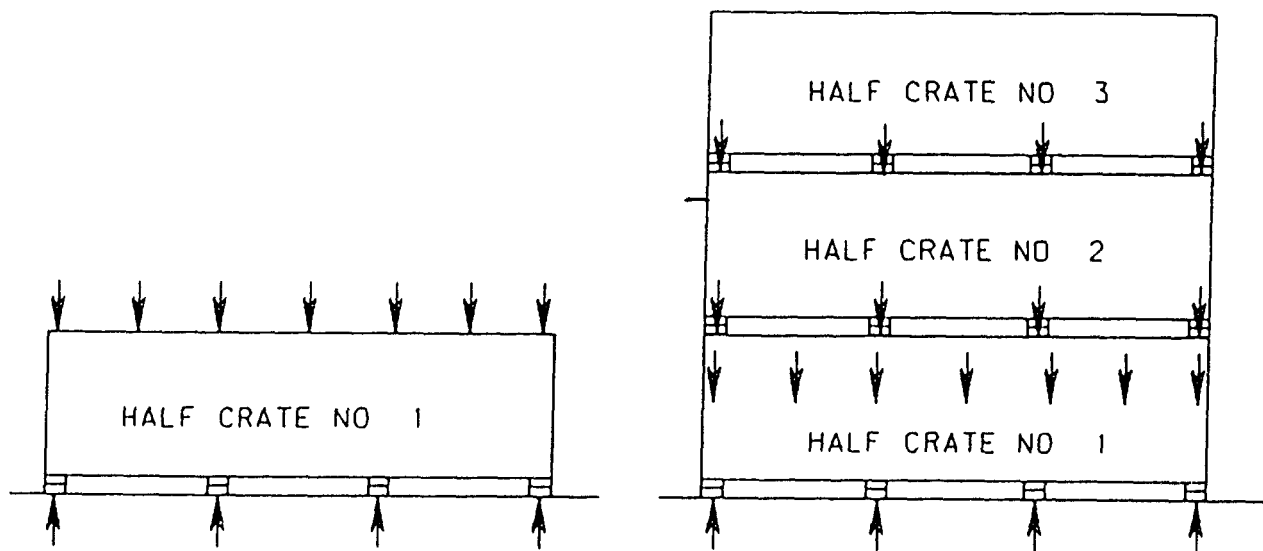


Figure II 1 - Half Crate Dimensions

As the half crates are stacked, the first or bottom crate has a uniform load of box and stabilized waste weight supported by four skids as illustrated in Figure II 2 (a).



(a)  
Loading of Half Crate  
No 1 with no additional  
crates

(b)  
Loading of Half Crate  
No 1 with additional  
crates

Figure No. II 2 - Half Crate load/support configuration.

The two interior skids carry a greater load than the exterior skids. As additional half crates are added four point loads are superimposed on top of the bottom crates uniform load (see Figure No II 2(b)) Figure No II 3 provide a table of the "Paving Soil Loadings" versus stack height It can be seen from the table that stacking half crates higher than one half crate high, results in loads greater than the 1500 PSF allowable

NO OF HALF CRATES	PAVING/SOIL LOADINGS	
	INTERIOR SKIDS ①	EXTERIOR SKIDS ①
1	1,553 PSF	565 PSF
2	3,110 PSF	1,131 PSF
3	4,664 PSF	1,697 PSF
4	6,218 PSF	2,263 PSF

① PROJECTED BEARING  
AREA APPROXIMATELY 1.07 SF

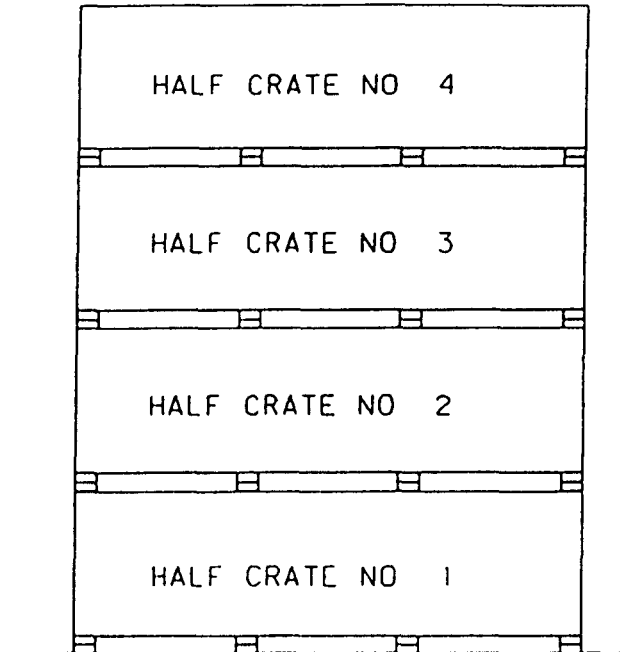


Figure II 3

Table of paving/soil loadings for half crates loaded with stabilized waste without cribbing supports

Field observations indicate the half crates are currently being stored on the pads four half crates high. The skids of the half crates have depressed the asphalt roughly 1/16 to 1/8 inch. These observations indicate the allowable loading of 1500 PSF is conservative.

Higher allowable stack heights can be achieved by providing a means of distributing the weight of the half

crates over a larger area than the bottom of the 3-1/2 inch wide skids. This can be done by cribbing under the bottom of the No 1 crate with stiff beams. The beams can be manufactured from steel, concrete or wood. The determination of which material to use should be the result of capital and decontamination cost analysis. Figure No II.4 illustrates the structural analysis method used to determine the maximum stack of cribbing required. This graphic presentation shows a cribbing depth of nominally 12 inches provides the highest achievable load supporting under a half crate.

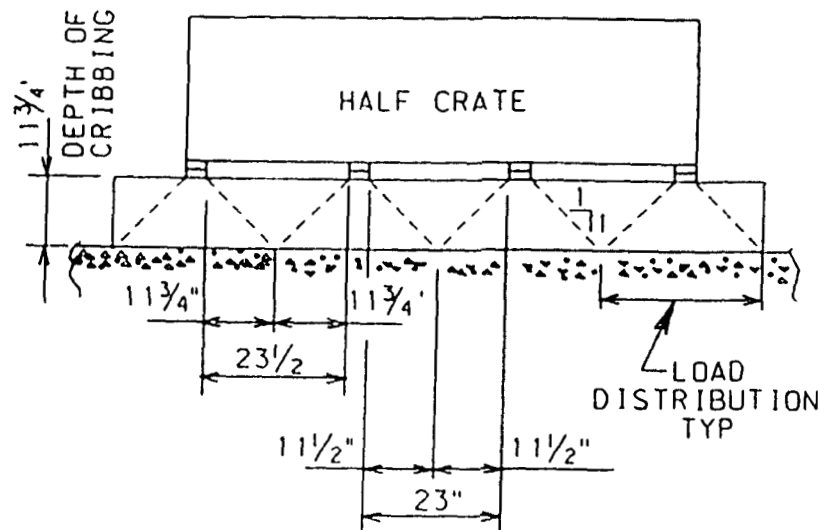


Figure II 4 - Half Crate Load Distribution Patterns

Figure II 5 provide a table of half crate stack heights versus paving/soil loadings for 12 inch thick cribbing.

- Conclusions from Paving/Soil Analysis



With an allowable paving/soil loading of 1500 PSF the following conclusions can be drawn:

- 1 Without cribbing the maximum allowable stack height is one half crate
2. With cribbing the maximum usable cribbing depth is 12 inches, which results in a maximum allowable stack height of ten half crates

NO OF HALF CRATES	PAVING/SOIL LOADINGS	
	INTERIOR SKIDS ①	EXTERIOR SKIDS ②
1	150 PSF	68 PSF
2	300 PSF	136 PSF
3	450 PSF	204 PSF
4	600 PSF	272 PSF
5	750 PSF	340 PSF
6	900 PSF	408 PSF
7	1050 PSF	476 PSF
8	1200 PSF	544 PSF
9	1350 PSF	612 PSF
10	1500 PSF	680 PSF

① PROJECTED BEARING  
AREA APPROXIMATELY 11 05 SF/SKID

② PROJECTED BEARING  
AREA APPROXIMATELY 8 85 SF/SKID

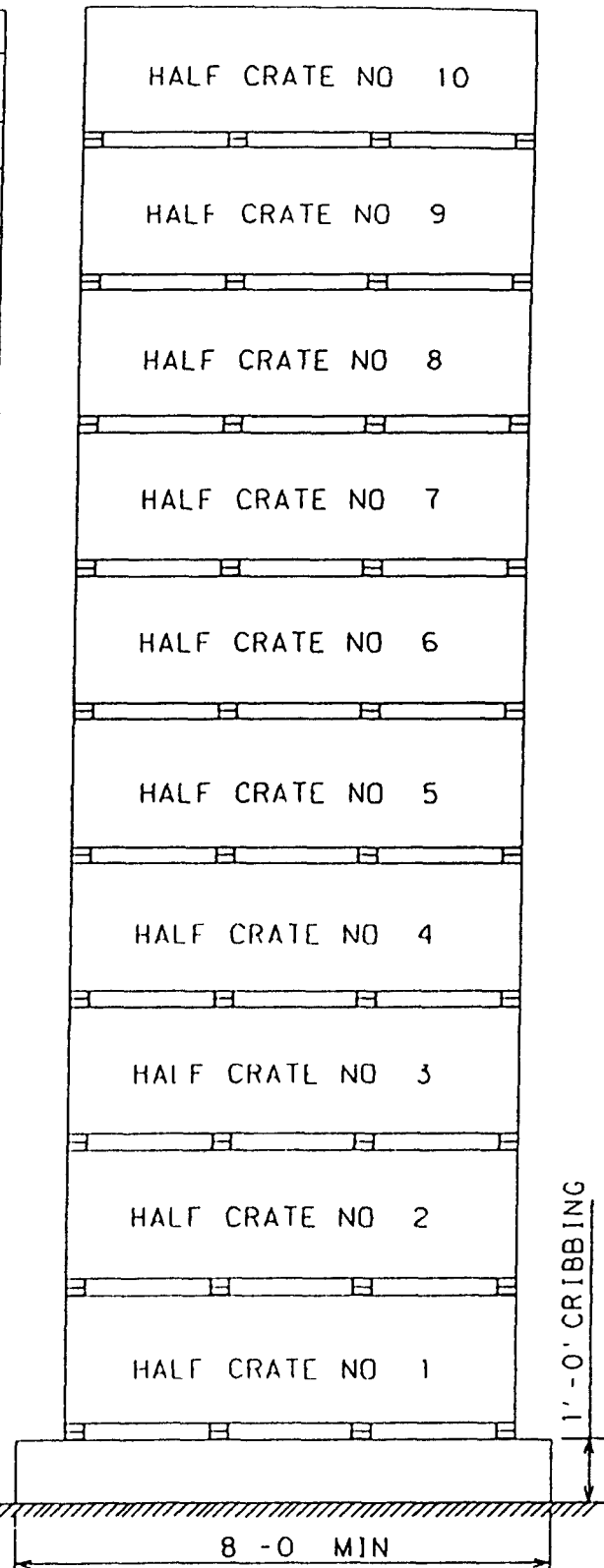


Figure No II 5

Table of paving/soil loading  
half crates loaded with stabilized  
waste with 12 inch deep cribbing  
supports.

During August of 1988 the Concrete and Structural Branch of the Bureau of Reclamation conducted compressive tests on six half crates for Rockwell International. The results of these tests are attached to Rockwell International internal letter number FBI.64 dated August 18, 1988. The tests were performed on half crates constructed to Rocky Flats Standard Number SX-211 and inspected by Rocky Flats Waste Certification Department to verify compliance with the standard. The tests were then run with the four bottom skids removed and a uniform load applied to the top of each crate. This method of loading simulated the loading conditions the half crates will encounter when stored at the Nevada Test Site, which was the goal of the test. These conditions are not the same that will be encountered when the crates are stored on the pads at Rocky Flats, which are illustrated in Figure II 2

Review of the test results indicate the half crates failed at the plywood end panels at loads that varied from 189,300 to 236,000 pounds. The average ultimate failure load was approximately 214,000 pounds, which is equivalent to a stack height of 47-1/2 half crates on top of the bottom crate

- Conclusions from half crate container crush strength consideration.

The compressive tests that were performed were not conducted using the same support and loading configuration that will be encountered

when the half crates are stored on the pads.  
The actual loading and support conditions may  
result in failures by a different mode.

We believe that similar tests with correct support and loading conditions will indicate the failure mode and compressive strength of the crates under actual conditions. These test results will confirm our assumption that the half crate compressive strength will be sufficient to allow stacking half crates to the limits of the paving/soil bearing capacity.

#### IV. SEISMIC LOADING CONSIDERATIONS

Revision 7 of the Project Plan for Rocky Flats Solar Pond/Pondcrete Stabilization Project dated May 21, 1991, pages 39 and 43 require that HNUS must comply with Seismic requirements as applicable

Structural design work at the Rocky Flats Plant is done in accordance with Plant Seismic design criteria. This criteria references the "Uniform Building Code" (UBC) for design calculations. In addition, the Rocky Flats seismic design criteria establishes special design factors, which relate to the degree of hazard involved, for use with UBC calculations

It can be seen on Attachment "I", Figure No. 23-2 - Seismic Zone Map of the United States, page 23-2 of the 1991 Uniform Building Code that the Rocky Flats Plant is located in Seismic Zone 1

Page 2336 of the "Uniform Building Code" (Attachment "II") states a lateral force-resisting system shall be provided for non-rigid equipment should failure of the lateral restraints result in a life hazard situation and further more it states that friction from gravity loads not be considered to provide resistance to seismic forces

These paragraphs in the UBC indicate the stacks of half crates should be provided with lateral restraints when stored more than one crate high. Currently the plant is not providing restraints for half crates

- Conclusions From Seismic Loading Considerations:

We believe the Uniform Building Code requires lateral restraints be provided for stacks of half crates regardless of height. We believe this to be true because a half crate stack failure could result in a life hazard situation

Since any height half crate stack requires lateral restraints, there is no seismic limitation on stack height, only difference in restraint requirements.

## V

### FORK TRUCK LIFT HEIGHT CONSIDERATIONS

EG&G currently uses two different styles of electric powered fork trucks on the 750 and 904 Pads. Although there are a few old Yale fork trucks, the predominate brand is Clark. There are fifteen (15) Clarke Series ECS 25, battery powered, 4 wheeled, cushion tired, lift

trucks and three (3) Clarke Series TM 15S, battery powered, 3 wheeled, multi-tire, lift trucks. The four wheeled lift trucks were used to retrieve and store containers of pondcrete and saltcrete in most locations, while the three wheeled lift trucks were used inside the permacons where movement was limited. The maximum lift at full capacity for the 4 wheeled fork trucks is 12'-8". The maximum lift for the 3 wheeled fork trucks is 12'-7". Referring to Figure V.1 on the following page, it can be seen that the maximum allowable stack height for the existing fork trucks is six half crate containers high.

It is possible to purchase new fork trucks with the capability of stacking half crates 10 high

- Conclusions From Fork Truck Lift Height Considerations:

- 1 The existing fork trucks can stack up to 6 half crates high
- 2 New fork trucks could be purchased to stack to the maximum allowable of 10 half crates high

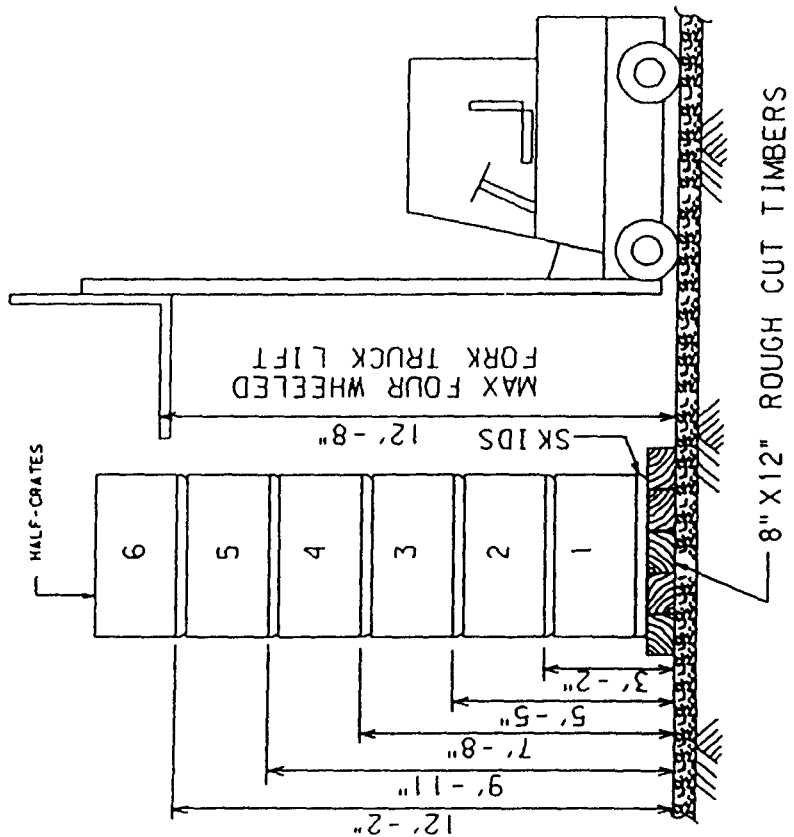
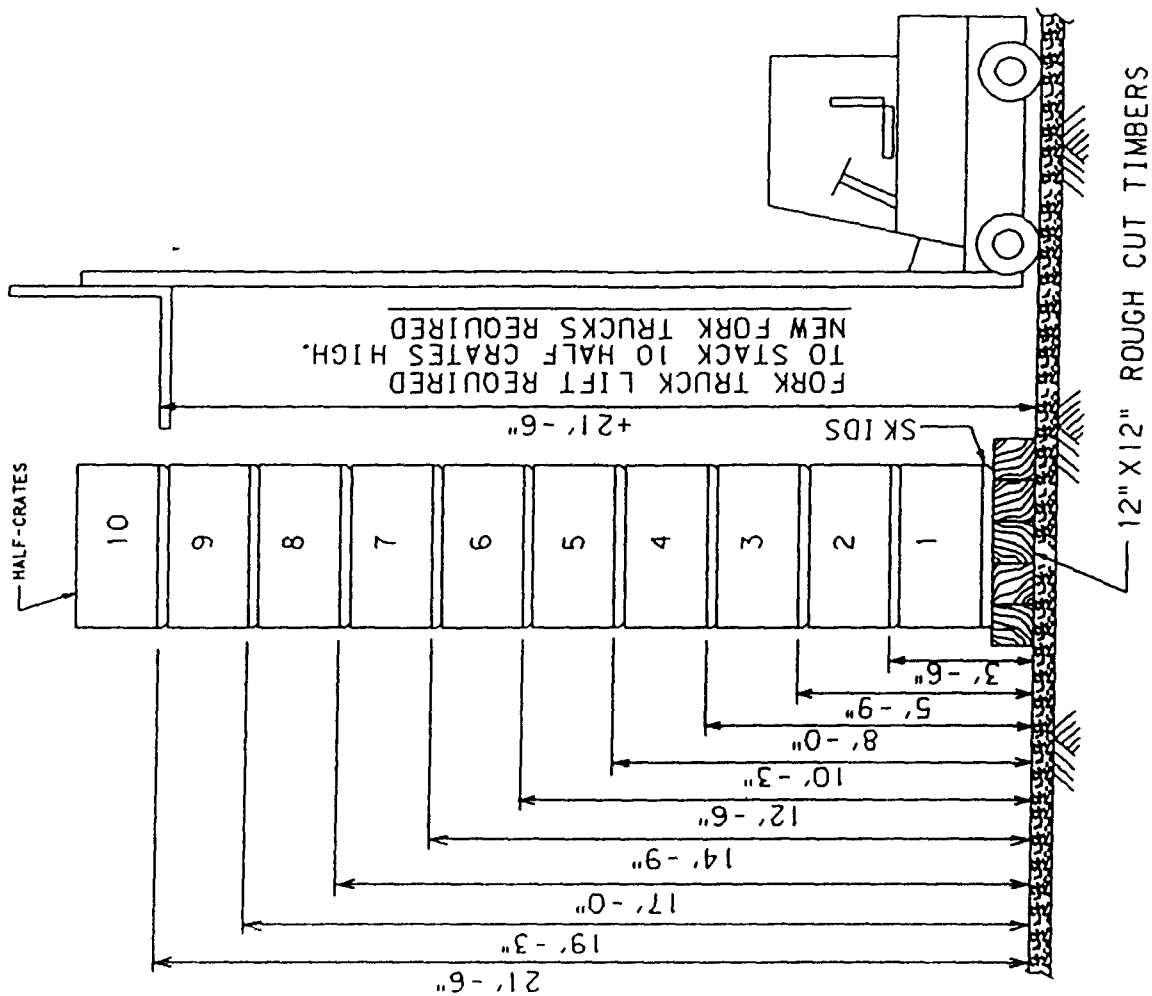


FIGURE V 1 ILLUSTRATION OF FORK TRUCK LIFT REQUIREMENTS

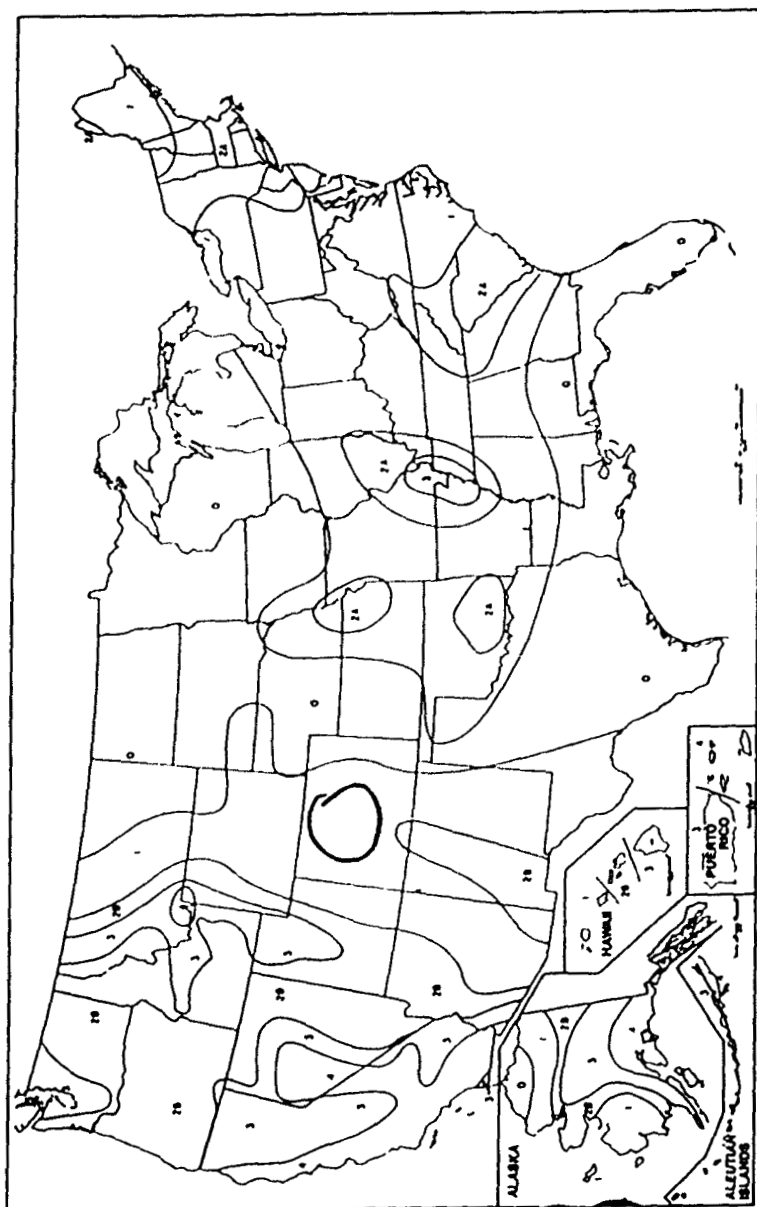
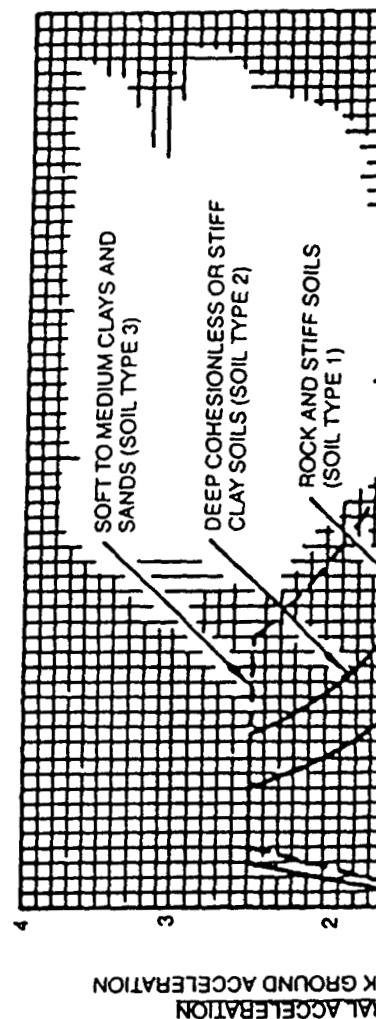


FIGURE NO 23-2—SEISMIC ZONE MAP OF THE UNITED STATES

For areas outside of the United States, see Appendix Chapter 23

194 ATTACHMENT "I"





response for each principal

placements story forces combined by recognized analysis modal interaction

in determined using these scaled up to these values percentage of the values

the base shear shall not be 4 using the period  $T$  cal

flexions member forces

ing these procedures need ling response parameters

ntal ground motion shall ffects of vertical ground nts shall be considered in seismic response may be all the response used for

cts including accidental three-dimensional mod ll be accounted for by ap of ma cations or by 2334

l by a dual system as de capable of resisting the The moment resisting analyzed using either the (c)

ill meet the requirements

onstructural

es and their attachments nts and the attachments designed to resist the to

Attachments shall include anchorages and required bracing Friction resulting from gravity loads shall not be considered to provide resistance to seismic forces

When the structural failure of the lateral force resisting systems of nonrigid equipment would cause a life hazard such systems shall be designed to resist the seismic forces prescribed in Section 2336 (b)

EXCEPTION Equipment weighing less than 400 pounds furniture or temporary or movable equipment

When allowable design stresses and other acceptance criteria are not contained in or referenced by this code or the U B C Standards such criteria shall be obtained from approved national standards

(b) Design for Total Lateral Force The total design lateral seismic force  $F_p$  shall be determined from the following formula

$$F_p = ZIC_pW_p \quad (36-1)$$

The values of  $Z$  and  $I$  shall be the values used for the building

EXCEPTIONS 1 For anchorage of machinery and equipment required for life safety systems the value of  $I$  shall be taken as 1.5

2 For the design of tanks and vessels containing sufficient quantities of highly toxic or explosive substances to be hazardous to the safety of the general public if released the value of  $I$  shall be taken as 1.5

3 The value of  $I$  for panel connectors for panels in Section 2337 (b) 4 C shall be 1.0 for the entire connector

The coefficient  $C_p$  is for elements and components and for rigid and rigidly supported equipment Rigid or rigidly supported equipment is defined as having a fundamental period less than or equal to 0.06 second Nonrigid or flexibly supported equipment is defined as a system having a fundamental period including the equipment greater than 0.06 second

The lateral forces calculated for nonrigid or flexibly supported equipment supported by a structure and located above grade shall be determined considering the dynamic properties of both the equipment and the structure which supports it but the value shall not be less than that listed in Table No. 23 P In the absence of an analysis or empirical data the value of  $C_p$  for nonrigid or flexibly supported equipment located above grade on a structure shall be taken as twice the value listed in Table No. 23 P but need not exceed 2.0

EXCEPTION Piping ducting and conduit systems which are constructed of ductile materials and connections may use the values of  $C_p$  from Table No. 23 P

The value of  $C_p$  for elements components and equipment laterally self supported at or below ground level may be two thirds of the value set forth in Table No. 23 P However the design lateral forces for an element or component or piece of equipment shall not be less than would be obtained by treating the item as an independent structure and using the provisions of Section 2338

The design lateral forces determined using Formula (36-1) shall be distributed in proportion to the mass distribution of the element or component

Forces determined using Formula (36-1) shall be used to design members and connections which transfer these forces to the seismic resisting systems

Attachment II

TIME STUDY

FOR

STRIPPING

A TRI-WALL

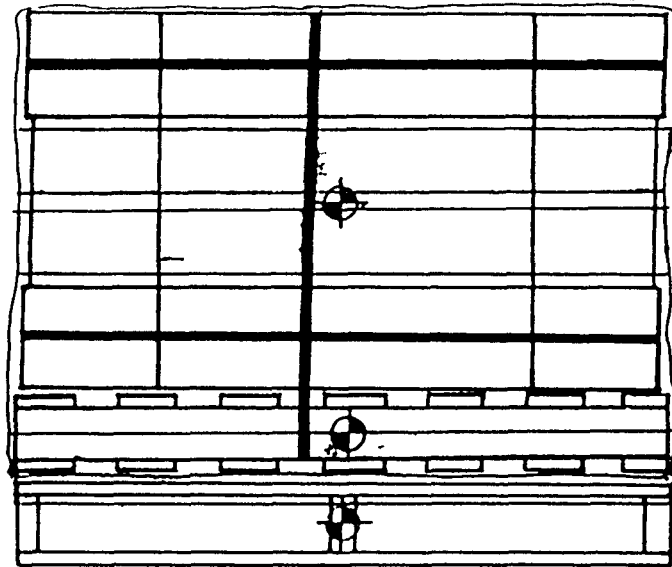
## Subject. Time Study for Skinning a Tri-wall

<u>Step No</u>	<u>Description</u>	<u>Duration (Min)</u>
0	- Tri-wall moves into positioner	- 1
1	- Cut off and remove top of outer PVC bag and top of inner pallet retaining strap	- 3
2	- Close positioner, lift and rotate Tri-wall	- 2
3	- Remove outer pallet	- 1
4	- Remove remainder of outer PVC bag	- 2
5	- Remove remainder of inner pallet retaining strap	- 1
6	- Remove inner pallet	- 1
7	- Remove bottom lid (which is now on top), cut off and remove bottom of inner PVC bag and remove fiberboard insert	- 5
8	- Close positioner, lift and rotate Tri-wall	- 2
9	- Remove top (which is now back on top)	- 2
10	- Remove Tri-wall body	- 5
11	- Remove remainder of inner PVC bag	- 5

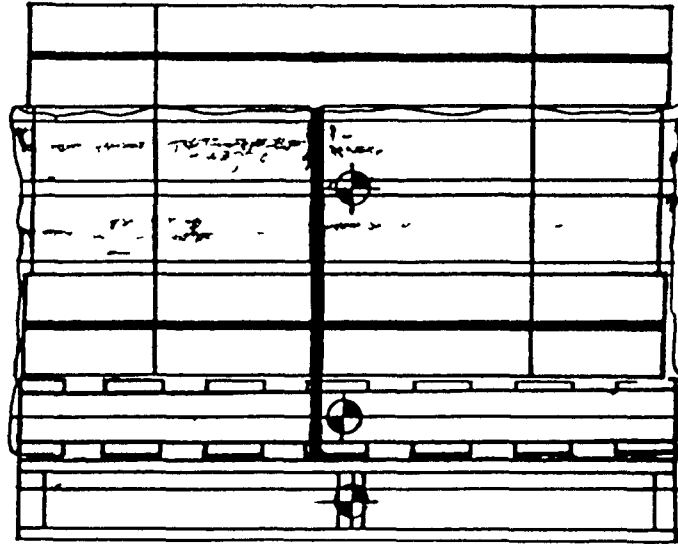
---

 50 min

STEP 0

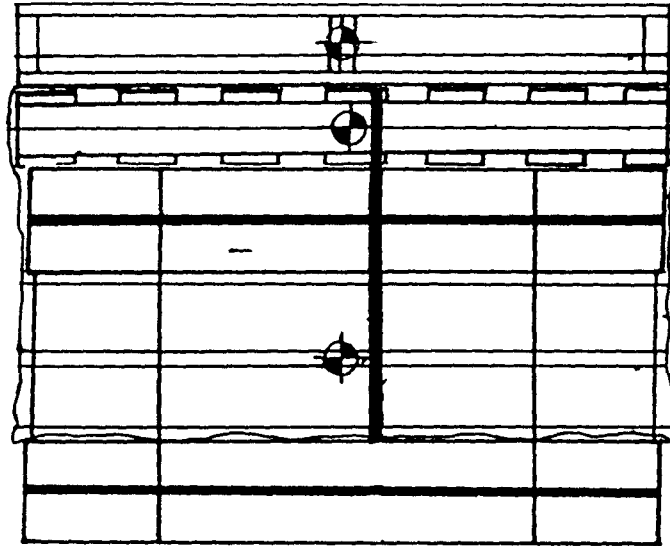


# STEP 1



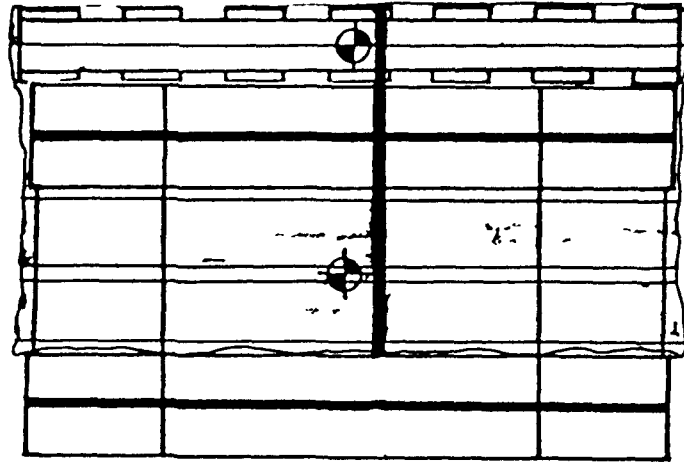
Cut-off top of outer PVC bag & pallet attachment strap.

## STEP 2



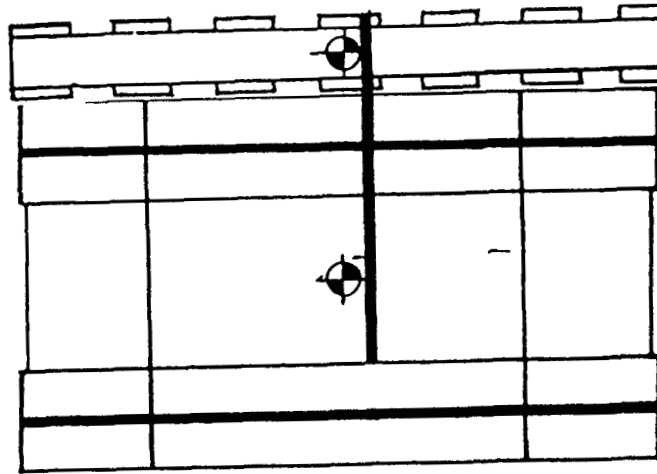
Rotate Tri-wall so pallets in  
top position.

## STEP 3



Remove outer pallet.

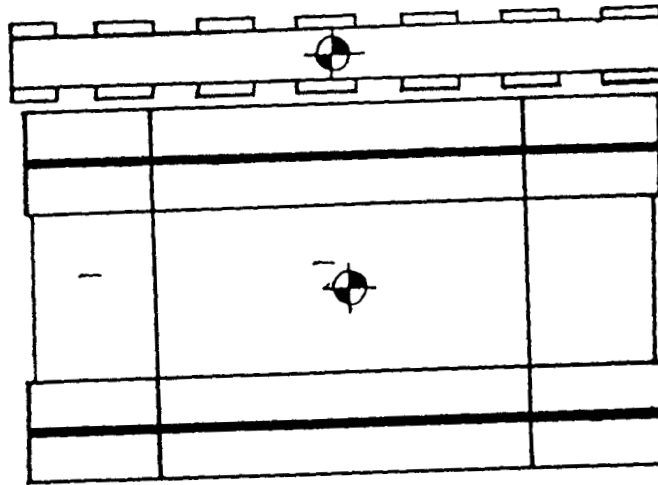
## STEP 4



Remove remainder of outer  
PVC bag.

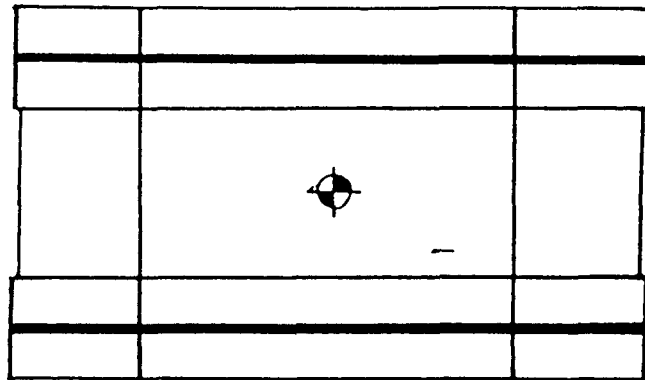


## STEP 5



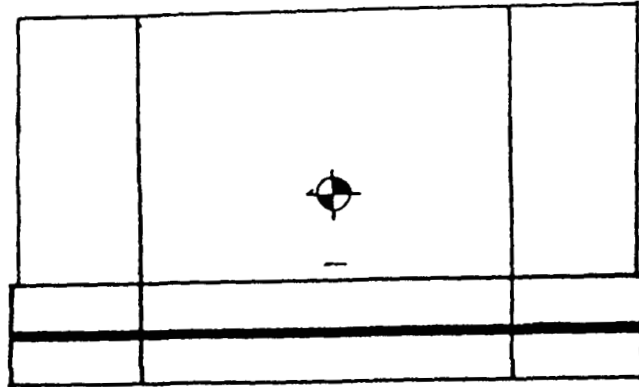
Remove remainder of pallet attachment strap.

## STEP 6



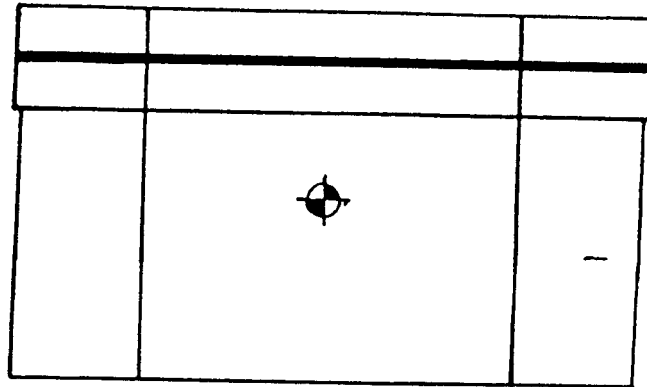
Remove inner Pallet.

## STEP 7



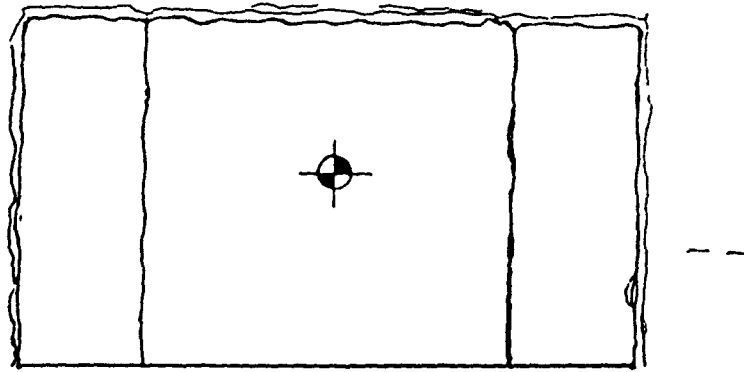
Remove top lid (originally bottom lid),  
bottom of PVC inner bag & fiberboard  
liner insert.

## STEP 8



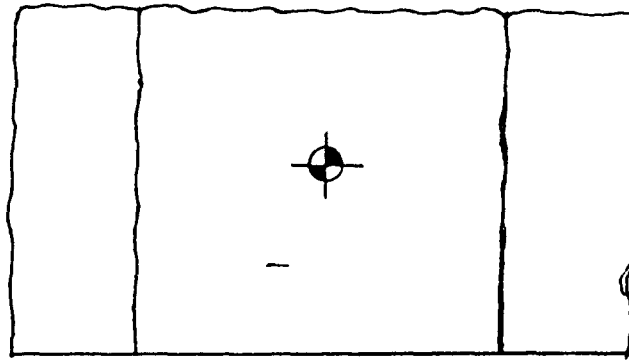
Rotate Tri-wall back to up right position.

## STEP 10

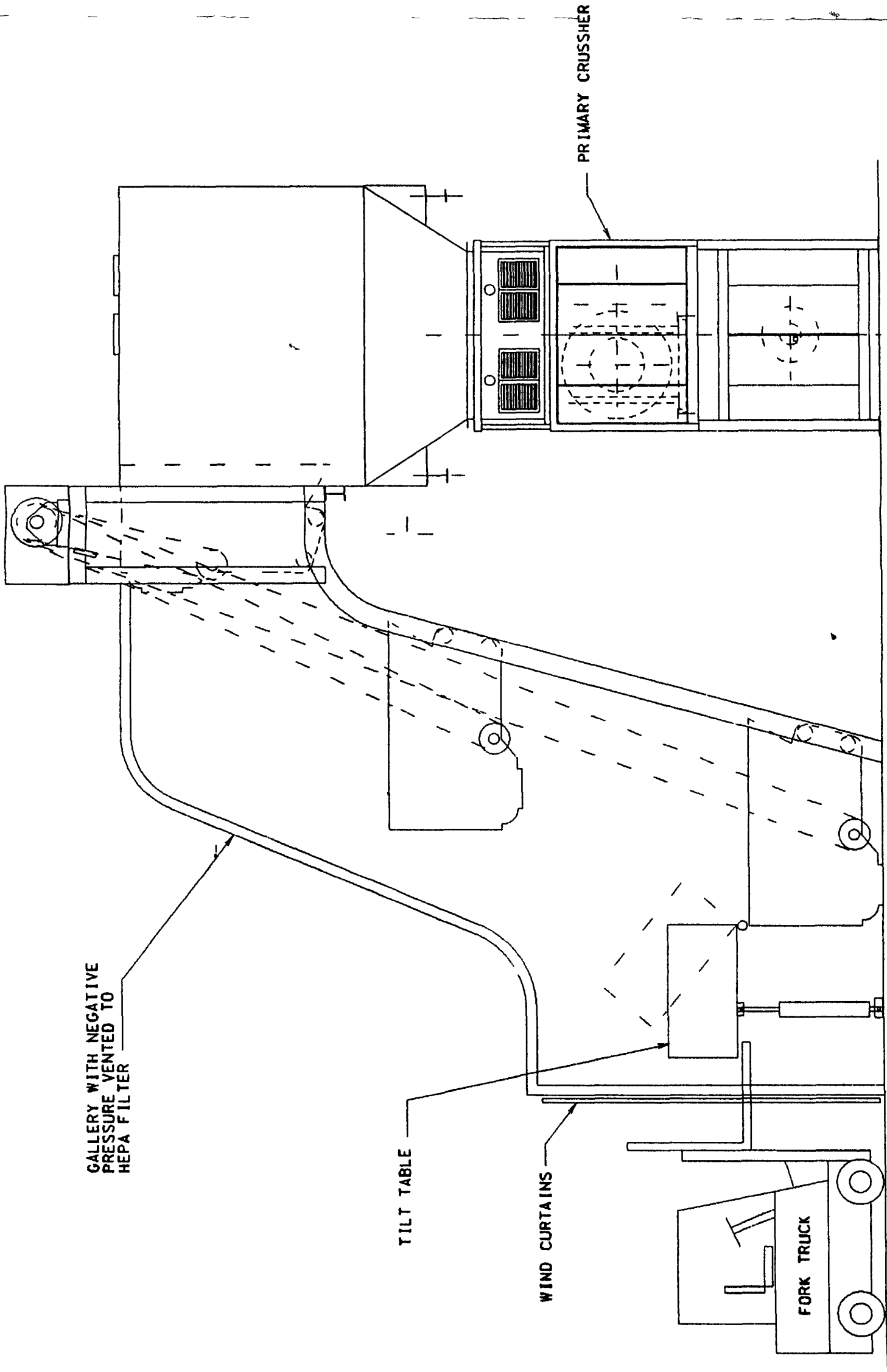


Remove Tri-wall Body.

STEP 11



Remove inner PVC bag.



ELEVATION LOOKING EAST



SCALE 1/4" = 1' 0"

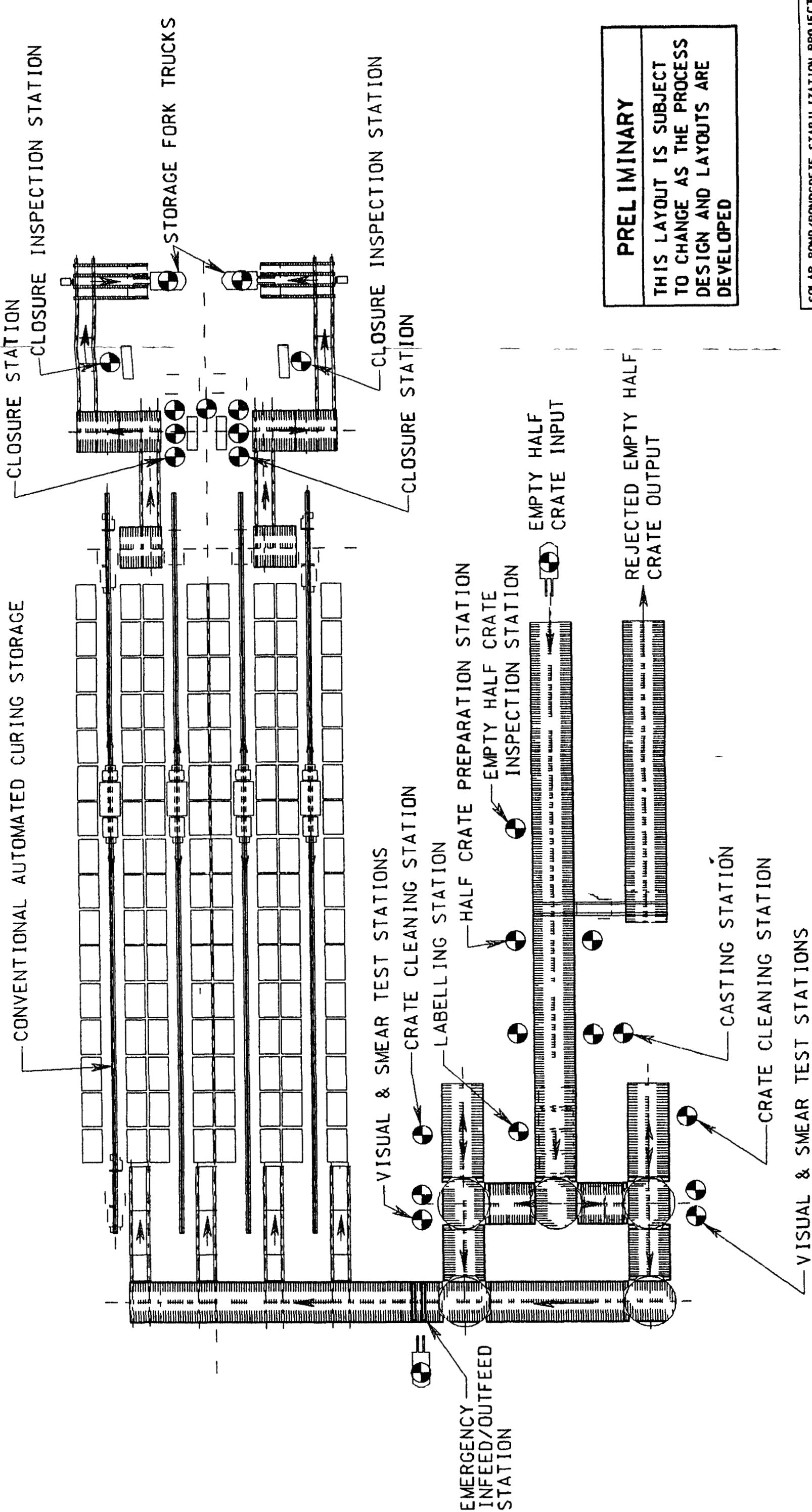
PRELIMINARY

COMIX WITH TRASH REMOVAL  
THIS ARRANGEMENT IS SUBJECT TO CHANGE AS THE PROCESS DESIGN AND LAYOUTS ARE FINALIZED

SOLAR POND/PONDCRETE STABILIZATION PROJECT  
MATERIAL HANDLING STUDY

PAD - 904 EQUIPMENT ARRANGEMENT  
SECTION THPU PRIMARY CRUSHER

DRAWING NO 3 2 1 1



**PRELIMINARY**

THIS LAYOUT IS SUBJECT TO CHANGE AS THE PROCESS DESIGN AND LAYOUTS ARE DEVELOPED

SOLAR POND/PONDCRETE STABILIZATION PROJECT  
MATERIAL HANDLING STUDY

TYPICAL FUNCTIONAL MATERIAL HANDLING  
EQUIPMENT ARRANGEMENT PLAN

DRAWING NO 3 2 1 2

NOTES

1 DENOTES A MAN



ROCKY FLATS SOLAR POND/FONDCRETE STABILIZATION PROJECT  
BROWN & ROOT JOB 10, JR 119  
MANNING REQUIREMENTS FOR AREAS 07 788 AND 750  
PROCESS CONFIGURATION LOW OR HIGH WATER RATIO

EG/G				HNUS			
		DIRECT HIRE		SUBCONTRACT			
AREA	WORK STATION	JOB DESCRIPTION	DAY SHIFT	SWING SHIFT	TOTAL	DAY SHIFT	SWING SHIFT
07/788/750	LABORATORY	MANAGER	1	1	2		
207 788/ 50	LABORATORY	TECHN A1	4	4	8		
207/778/7 0	LABORATORY	RUNNER	1	1	2		
07/788/750	ALL OF 788/750	OPERATIONS SUPPORT MANAGER	1		1		
07/788/750	ALL OF 207/788 7 0	MAINTENANCE FOREMAN	1	1	2		
207/788/750	ALL OF 07/788/7 0	LABORER	1	1	2		
207/788/750	ALL OF 207/788/750	HEALTH & SAFETY TECHNICIAN	1	1	2		
207/788/7 0	ALL OF 207/788/ 0	ELECTRICIAN/INSTRUMENT TECHNICIAN	1	1	2		
07/788	ALL OF 207/788 AREA	AREA OPERATIONS SUPERVISOR	1	1	2		
07 7 8	ALL OF 07/788 AREA	AREA MECHANIC	1	1	2		
07	OPERATING	OPERATOR			0	1	1
207	POND WALLS WASHDOWN	LABORER	4	2	6		
207	TRASH SCREEN/BOX AND PUMP IN	OPERATOR	1	1	2		
207	TRASH SCREEN/BOX	CHEMICAL OPERATOR	1	1	2		
788	SIZE REDUCTION	OPERATOR	1	1	2		
788	SIZE REDUCTION	OPERATOR S HELPER	1	1	2		
750	ALL OF 750 AREA	AREA OPERATIONS SUPERVISOR	1	1	2		
750	CEMENT/ADDITIVES UNLOADING	OPERATOR	1	1	2		
7 0	PROCESS UP TO CASTING	ROVING OUTSIDE OPERATOR	1	1	2		
750	PROCESS UP TO CASTING	CONTROL ROOM OPERATOR	1	1	2		
750	PROCESS UP TO CASTING	MECH NIC	1	1	2		
7 0	CASTING FORK TRUCK	FORK TRUCK OPERATOR	1	1	2		
750	HALF CRATE PREP CREW	LABORER	2	2	4		
750	CASTING	OPERATOR	1	1	2		
750	CASTING	OPERATOR S HELPER	1	1	2		
750	CASTING	SAMPLE TECHNICIAN	1	1	2		
750	LABELLING STATION	CHEMICAL OPERATOR	1	1	2		
750	VISUAL TEST	WASTE INSPECTOR	1	1	2		
750	SHEAR TEST	RAD TECHNICIAN	2	2	4		
7 0	CLEANUP CREW	CHEMICAL OPERATORS	2	2	4		
750	CURING AREA	ROVING CHEMICAL OPERATOR	1	1	2		
750	CLOSURE STATION	CARPENTERS	4	4	8		
7 0	CLOSURE STATION	PAINTER	1	1	2		
750	CLOSURE STATION	CHEMICAL OPERATORS	2	2	4		
750	CLOSURE INSPECTOR ON STATION	WASTE INSPECTOR	2	2	4		
750	FIRECLAN CLEANUP	CHEMICAL OPERATOR	1	1	2		
750	STORAGE FORK TRUCKS	FORK TRUCK OPERATOR	1	1	2		
7 0	CURING/CLOSURE	MECHANIC	1	1	2		
750	CURING/CLOSURE	ELECTRICIAN/INSTRUMENT TECHNICIAN	1	1	2		
07/788/ 0	TOTAL		24	24	48	1	1

NOTES

1. ESMG SHALL SUPPLY THEIR OWN SUPERVISORY PERSONNEL AS REQUIRED
2. THESE MANNING REQUIREMENTS DO NOT INCLUDE OFF POND SUPPORT PERSONNEL SUCH AS THE PEOPLE THAT DELIVER SUPPLIES TO THE POND SUCH AS HALF CRATES, SHEAR TEST SUPPLIES ETC
3. ALL OPERATORS ARE ASSUMED TO BE NORMALLY LOCALLY LOCATED OUTSIDE OF A FARMACON

ROCKY FLATS SOLAR POND/CONCRETE STABILIZATION PROJECT  
FROM: ROOT JOB NO JR 1198  
MANNING REQUIREMENTS FOR AREA 904

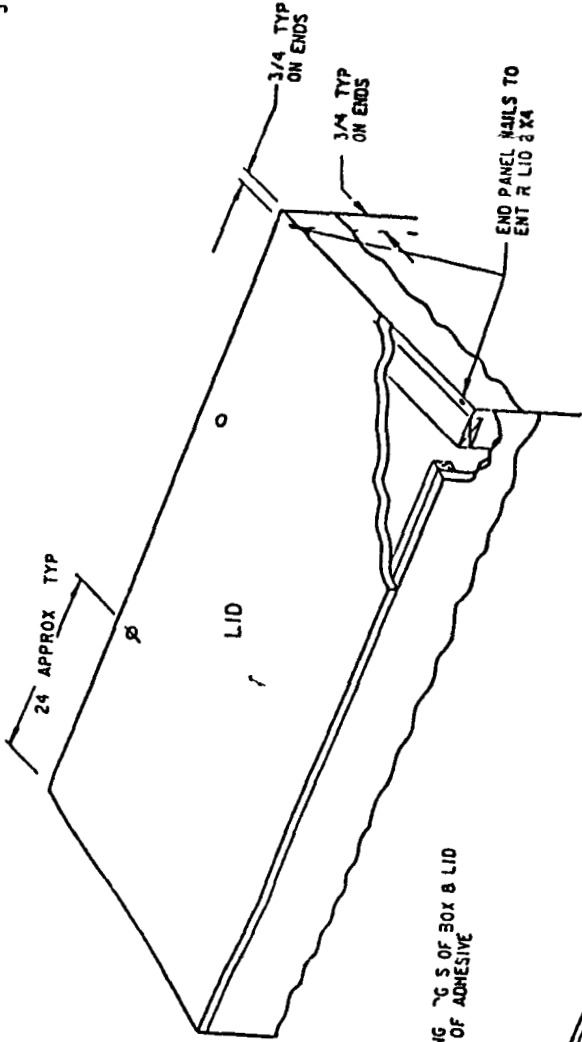
PROCESS CONFIGURATION LOYIX WITH TR SH REMOVAL

AREA	JOB DESCRIPTION	Eg 6			HUS			UBCO ATNA T		
		DIRECT HIFE			DAY			SWIN		
		DAY	SH	FT	DAY	SH	FT	DAY	SH	FT
904	MANAGER	0	1	0	1	1	0	1	1	0
904	TECHNICAL	0	0	0	0	4	0	0	0	0
904	RUNNER	0	0	0	0	1	0	0	0	0
904	OPERATOR	0	0	0	0	1	0	0	0	0
904	MAINTENANCE FOREMAN	0	0	0	0	1	0	0	0	0
904	QA/QC TECHNICIAN	0	0	0	0	1	0	0	0	0
904	HEALTH SAFETY TECHNICIAN	0	0	0	0	1	0	0	0	0
904	ELF TR CAL/INSTRUMENT TECHNICIAN	0	0	0	0	1	0	0	0	0
904	AREA OPERATIONS SUPERVISOR	0	0	0	0	1	0	0	0	0
904	AR MECHANIC	0	0	0	0	1	0	0	0	0
904	OPERATOR	0	0	0	0	1	0	0	0	0
904	FORK TRUCK OPERATOR	0	0	0	0	1	0	0	0	0
904	OPERATOR	0	0	0	0	1	0	0	0	0
904	MECHANIC	0	0	0	0	2	0	0	0	0
904	OPERATOR	0	0	0	0	1	0	0	0	0
904	OPERATOR	0	0	0	0	1	0	0	0	0
904	OPERATOR	0	0	0	0	1	0	0	0	0
904	MECHANIC	0	0	0	0	1	0	0	0	0
904	FORK TRUCK OPERATOR	0	0	0	0	1	0	0	0	0
904	LABORER	0	0	0	0	2	0	0	0	0
904	OPERATOR	0	0	0	0	1	0	0	0	0
904	OPERATOR'S HELPER	0	0	0	0	1	0	0	0	0
904	SAMPLE SPINCH	0	0	0	0	1	0	0	0	0
904	CHEMIC OPERATOR	0	0	0	0	1	0	0	0	0
904	WASTE INSPECTOR	0	0	0	0	1	0	0	0	0
904	RAD TECHNICIAN	0	0	0	0	1	0	0	0	0
904	CHEMICAL OPERATOR	0	0	0	0	1	0	0	0	0
904	ROVITC LHEM AL OFFRATER	0	0	0	0	1	0	0	0	0
904	CARFETER	0	0	0	0	1	0	0	0	0
904	PAINTER	0	0	0	0	1	0	0	0	0
904	CHEMICAL OPERATORS	0	0	0	0	1	0	0	0	0
904	WASTE INSPECTOR	0	0	0	0	1	0	0	0	0
904	CHEMICAL OPERATOR	0	0	0	0	1	0	0	0	0
904	FORK TRUCK OPERATOR	0	0	0	0	1	0	0	0	0
904	MECHANIC	0	0	0	0	1	0	0	0	0
904	FF TRICA / I STR / IT E F I CAN	0	0	0	0	1	0	0	0	0
904	LABORER	0	0	0	0	1	0	0	0	0
904	CHEMICAL OPERATOR	0	0	0	0	1	0	0	0	0
904	CHEMICAL OPERATOR	0	0	0	0	1	0	0	0	0
904	SAM E TECHNICAL	0	0	0	0	1	0	0	0	0
904	CHEMICAL OPERATOR	0	0	0	0	1	0	0	0	0
904	WAS E S F E P D R	0	0	0	0	1	0	0	0	0
904	RAD ECHNICAL	0	0	0	0	1	0	0	0	0
904	CHEMICAL OPERATOR	0	0	0	0	1	0	0	0	0
904	CHEMICAL OPERATOR	0	0	0	0	1	0	0	0	0
904	FAINTER	0	0	0	0	1	0	0	0	0
904	CHEMICAL OPERATORS	0	0	0	0	1	0	0	0	0
904	CHEMICAL OPERATORS	0	0	0	0	1	0	0	0	0
904	WASTE INSPECTOR	0	0	0	0	1	0	0	0	0
904	STATION W STE INSPECTOR	0	0	0	0	1	0	0	0	0
904	FORK TRUCK OPERATOR	0	0	0	0	1	0	0	0	0
904	MECHANIC	0	0	0	0	1	0	0	0	0
904	TOTAL	40	40	80	8	7	5	0	0	0

NOTE: 1. EG-6 SHALL SUPPLY THEIR OWN SUPERVISORY PERSONNEL AS REQUIRED.  
THESE MANNING REQUIREMENTS ARE FOR THE PROJECT ONLY AND DO NOT INCLUDE THE MANNING REQUIREMENTS FOR THE PROJECT AREA ETC.

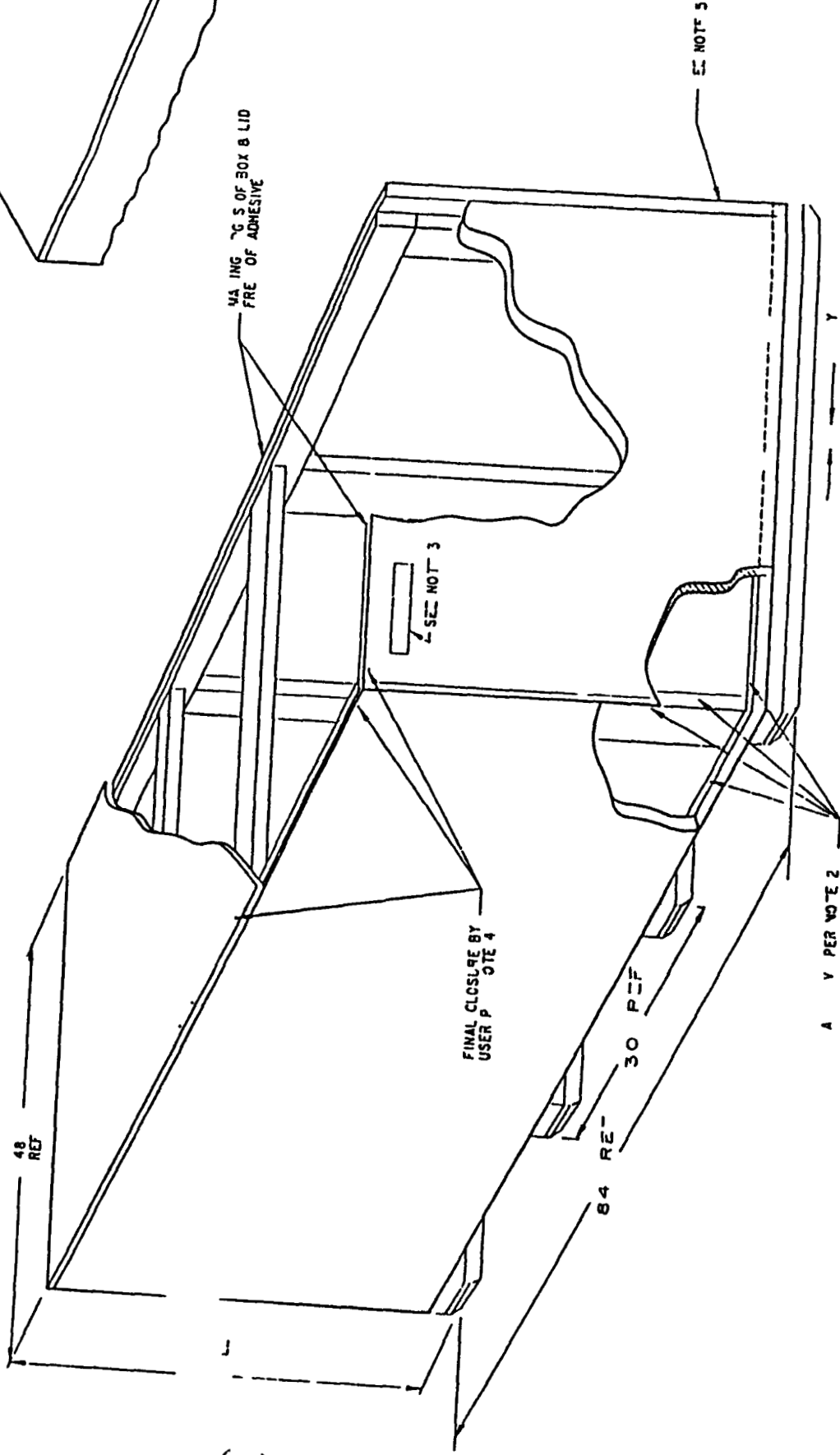
NOMINAL BOX SIZE	OVERALL HEIGHT
48 X 48 X 84	5
24 X 48 X 84	-

- NOTES
- DRAWING INSTRUCTIONS PER ANSI Y14.5. ALL DIMENSIONS ARE IN INCHES. TOLERANCES 1/8 INCH EXCEPT AS NOTED.
  - ASSUMABLE BOX PER PARAGRAPH 6. MATERIALS 7. CONSTRUCTION 8. FINISHING AND/OR STAPLING AND 9. ADHESIVE/GLUE.
  - STENCIL LEGIBLY WITH BLACK PAINT. MANUFACTURE SHALL OR SYMBOLS AND OR DATE OF MANUFACTURE 2 LINES ON OPPOSITE ENDS USING HARAC-5S AT LEAST 3/4 INCH HIGH PER PARAGRAPH 9 IDENTIFICATION.
  - USER SHALL MAKE FINAL BOX CLOSURE WITH MATERIALS SPECIFIED IN NOTE 2. APPLY ADHESIVE ALONG TOP EDGE OF SIDES WHERE A SEAM IS FORMED BY THE 2 X 4 AND THE 3/4 INCH PLYWOOD AND ALONG THE JOINTS OF THE LID WHERE THE 2 X 4 AND THE PLYWOOD FORM A 90 DEGREE ANGLE. NAIL THE LID IN PLACE USING 8d NAILS ON 3 INCH CENTERS. 1 1/4 INCH DRIVE TWO 16d NAILS THROUGH SIDE ENDS OF BOX AS SHOWN. DRIVE TWO 16d NAILS THROUGH SIDE PANELS INTO THE ENDS OF THE 2 X 4 ON THE LID (16 PLACES).
  - COAT EXTERIOR WITH CLASS A FIRE RETARDANT PAINT PER PARAGRAPH 11 PAINTING.



SEE NOTE 3 FOR SHIPPING PURPOSES ONLY  
SEE PARAGRAPH 12, RFP STD X 211

### DETAIL 1



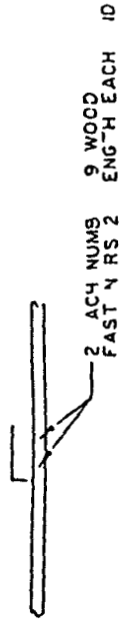
MASTER DRAWING	
DATE	1/1/74
BY	2
CHKD	3

RFP STANDARD	
NO	1
REV	1

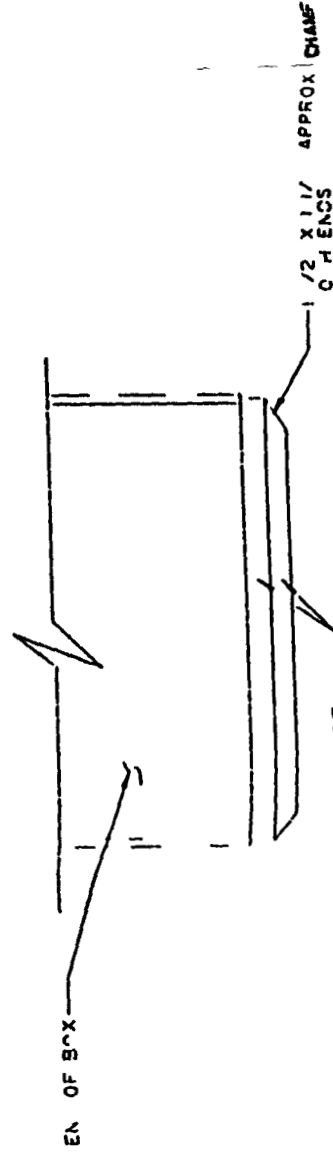
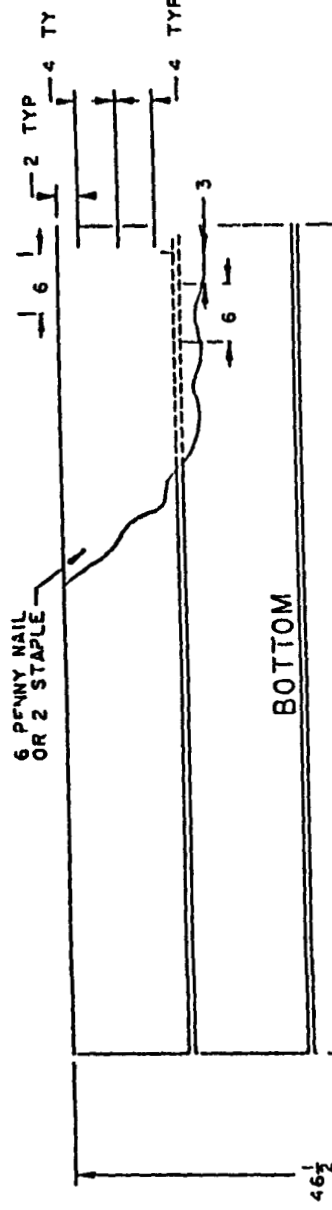
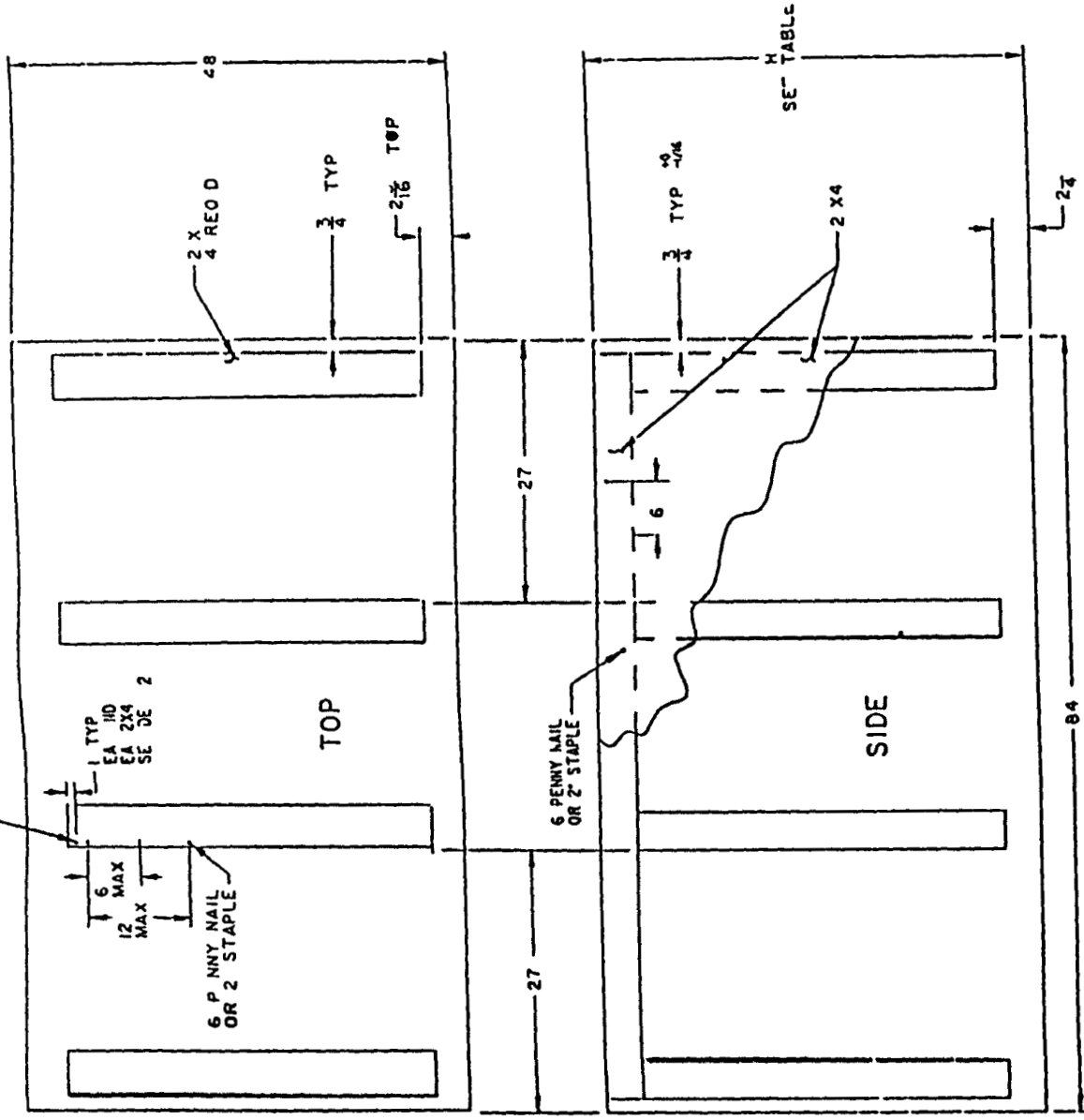
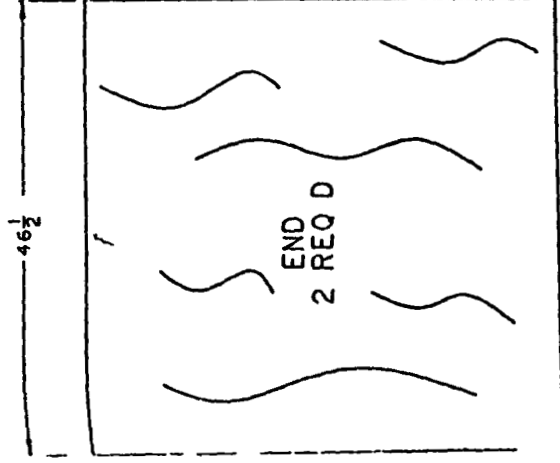
J	HL	5	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000
KEYWORDS	- 2000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									

## NOTES

- 1 MAT RIAL P R PARA APH 6 RFP S D SX ZII  
2 CO ST UC ION P R GRAPH 7 P P STD SX ZI  
3 S CUR O R 2 X 12 1/2 BOARDS TO 80 TOL PAN L  
ALIGNING O TE OF PANEL WITH C Y  
BOARDS QUALITY P D P DRAWING  
4 FAS H 2X SKIDS N PAIRS USING 10 P NY CE F4  
COA D NAL S N P TRY SHOWN  
5 THICKN SS OF PLY T MAY CAUSE DIM NSION  
VARIAT CH  
6 ALL DIA NSONS AR IN INCH 5 TOL RANG 1/8 INCH  
EXC PT AS NOTED

DE-AIL 2

NO. 1 NAL BOX SIZE	DIM H
48 X 84	9
46 X 4	24



RFP STANDARD

KEYWORDS	A	2	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
KEYWORDS	A	2	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
KEYWORDS	A	2	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
KEYWORDS	A	2	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
KEYWORDS	A	2	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
KEYWORDS	A	2	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
KEYWORDS	A	2	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
KEYWORDS	A	2	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
KEYWORDS	A	2	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
KEYWORDS	A	2	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
KEYWORDS	A	2	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
KEYWORDS	A	2	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
KEYWORDS	A	2	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
KEYWORDS	A	2	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
KEYWORDS	A	2	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
KEYWORDS	A	2	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
KEYWORDS	A	2	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
KEYWORDS	A	2	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	2																																																																															

WASTE DRAINING

17

Product Specifications

General Information		Manufacturer	Mfr designation	Clark ECS 17 3500/1750 24/500 36 Volt   48 Volt Rider Counterbalanced Cushion on 2x/2	Clark ECS 20 4000/2000 24/500 36 Volt   48 Volt Rider Counterbalanced Cushion on 2x/2	Clark ECS 22 4500/2250 24/500 36 Volt   48 Volt Rider Counterbalanced Cushion on 2x/2	Clark ECS 25 5000/2500 24/500 36 Volt   48 Volt Rider Counterbalanced Cushion on 2x/2	Clark ECS 27 5500/2750 24/500 36 Volt   48 Volt Rider Counterbalanced Cushion on 2x/2	Clark ECS 30 6000/3000 24/500 36 Volt   48 Volt Rider Counterbalanced Cushion on 2x/2
Basic Dimensions 2	1	Model							
	2	Load Capacity							
	3	Load Center							
	4	Power Unit							
Performance 2	5	Operator Type							
	6	Tire Type							
	7	Wheels (x driven)							
	8	Upright							
Weights 2	9	Max. lift full capacity TSU							
	10	Lift height preferred TSU							
	11	Free lift 3 stage							
	12	Std. fork size (TxWxL)							
Chassis	13	(TSU Upr )							
	14	Length to fork face							
	15	Width (std tires)							
	16	Height, upright lowered							
Drive Line	17	Height, upright extended (LBR)							
	18	Clearance to fork face							
	19	Load center distance							
	20	Right Angle Stack Axis							
Stability	21	According to ANSI							
	22	With load (36/48V)							
	23	Without load (36/48V)							
	24	With load (36/48V)							
Travel Speeds	25	Without load (36/48V)							
	26	Standard (36/48V)							
	27	Triple-stage (36/48V)							
	28	Standard (36/48 V)							
Service Weight	29	M n. battery wt 30.5 comp							
	30	With load front							
	31	With load rear							
	32	Without load front							
Tires	33	Without load rear							
	34	Number front/rear							
	35	Size front							
	36	Size rear							
Wheelbase	37	Front Cushion							
	38	Rear Cushion							
	39	Minimum with load							
	40	At center of wheelbase							
Brakes	41	Service							
	42	Parking							
	43	Steering							
	44	Battery							
Motors Controls	45	Type							
	46	Max Cap (Ghr rate) 30.5 comp							
	47	Weight minimum							
	48	Drive motor dia.							
Hydraulic Pressure max	49	Hydraulic motor dia.							
	50	Drive motor control							
	51	Speed control							
	52	Hydraulic motor control							
For Attachments	53	psi							
	54	Adjustable							
	55	42%							
	56	40%							

1 See upright table Contact Clark Representative for additional lift heights.  
2 Specifications are given with triple stage upright, standard battery compartment size and minimum battery weight.

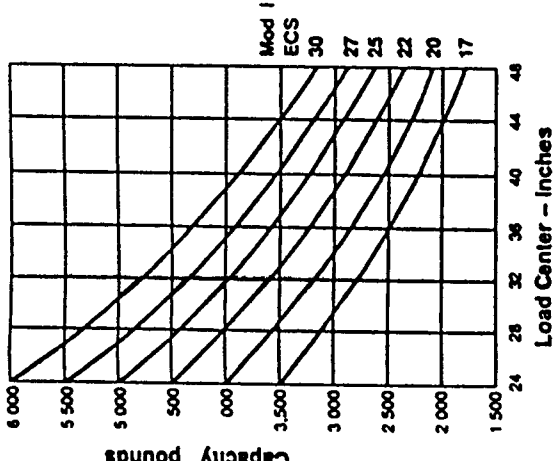
## Truck Capacity

Truck Capacities shown below are computed with upright position. Load centers are determined from top and front face of forks. Capacities are based on a 48 inch cube load configuration with the center of gravity (CG) at the true center of the cube and standard forks.

Truck capacities with upright in forward tilt position will be less. Long forks and unusually wide or tall loads may also reduce capacity. Contact Clark representative for capacity information on irregular loads.

Specific capacities are shown on truck nameplates.

Capacity at Load Center - U.S.



## General Data

Upright Table

Maximum Fork Height	Overall Height Lowered	Free Lift
130 inches	87 inches	4.3 inches

Standard	ECS 17/20/22/25/27/30	
75	60	4.3
123	83	4.3
130	87	4.3

HI LO	ECS 17/20/22/25
-------	-----------------

ECS 27/30	77	55
113	83	61
125	95	73
149		

Triple Stage ECS 17/20/22/25
---------------------------------

ECS 27/30	77 7	52
170	83 6	58
188	98	73
226		

Quad Mast Available	77	52
170	83	58
226	98	73

Indicates Preferred Standard sizes.  
For overall height raised with load backrest, add 48 inches to maximum fork height.  
Other uprightrigible contact Clark representative.  
\*\* All free lift dimensions shown without standard 48 inch load backrest.

### ANSI and Insurance Classifications

Standard truck meets all applicable mandatory requirements of ANSI B56.1 1969-1983 Safety Standard for Powered Industrial Trucks and Underwriters Laboratories requirements for electrical shock hazard only for "E" classification. For further information contact Clark representative.

### Notes

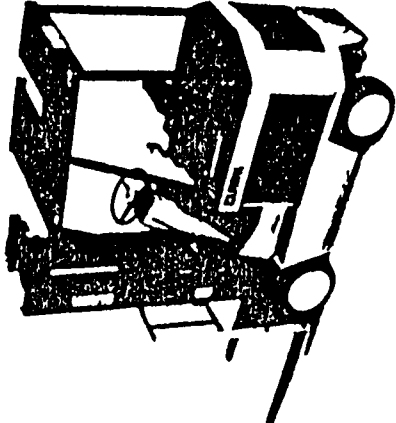
Performance may vary 5% and 10% due to motor and system efficiency tolerance. The performance shown represents nominal values obtained under typical operating conditions of standard machine.

Clark products and specifications are subject to change without notice.

Clark is a registered trademark of Clark Equipment Company. © Copyright Clark Equipment Company 1985.

## Product Description

The Clark ECS Series cushion tire electric trucks are characterized by advanced concepts to increase productivity, responsive operation, reduced maintenance and improved human engineering. With dual 36/48 voltage capability for simple field modification and greater tolerance to high-cycle and high ambient temperature operation, these electrics are suited to virtually all industries.



### Operator Comfort/Convenience

Low step height (19")  
Non-polluting operation  
Low sound emission  
Hydrostatic power steering is standard  
Responsive pre-reduction disc brakes  
Adjustable seat (6") smooth vinyl covering for easy on/off movement  
thick cushion, deeply contoured  
Large palm size control knobs  
International symbols identify functions  
Fully adjustable tilting steering pylon

Compartment design allows operator to step on or off from either side. Exposed surfaces are smooth and rounded to help prevent snagging or injury.

The ECS Series is equipped with a seat belt which is designed to protect the operator in the event of truck overturn.

Forward neutral reverse directional control knob is mounted directly below the 15 inch diameter handwheel to allow left hand fingertip operation. Separate lift and lower tilt and auxiliary controls are at natural right hand position on the seat deck.

Key switch, hour meter and Curtis 933-3 discharge indicator with lift lockout are standard equipment and fully visible on the steering pylon.

Overhead guard has longitudinal bars to improve forward visibility, finished in flat black to help reduce glare.

Low cowl height and narrow pylon increase operator's view of forward floor level activity.

### Motors

Drive motor and hydraulic lift pump motor are ventilated and fan cooled. A radial fan

providing equal airflow in forward or reverse continuously forces outside air through the ventilated motor casings, removing heat for extended motor life.

Steer pump motor is permanent magnet type selected for its long lasting low maintenance characteristics.

### Electrical Controls

Solid state speed control has minimum wear parts.  
General Electric EV100 Microprocessor SCR (silicon controlled rectifier) drive motor control. High available torque control in the SCR range.  
SCR protected by thermal limit, current limit and pulse monitoring trip circuit.  
Reverse polarity protection prevents damage to control.

The SCR provides infinitely variable speeds in both forward and reverse. Higher current limit settings and greater thermal capacity increases truck's ability to respond under load climb ramps and meet other power demands.  
Thermal and current sensing prevents damage to the SCR control if design limits are exceeded. The design of the EV100 system incorporates directional contactors that do not arc under normal operating conditions. This means no chance of tip welding under normal conditions. The complete system including contactors is mounted in the counterweight for ease of access and away from motor generated heat and possible hydraulic contamination.

### Drive Line

Reliable plug in drive motor design.  
Fully enclosed brakes and gears.  
Axle housing supports upright on large trunnion mounts.

Plug in drive motor with heavy mounting flange mates the spined armature shaft directly to the axle assembly for positive alignment and improved heat dissipation. Axle end gear reduction delivers maximum torque at the drive wheels.

### Brakes

Enclosed oil-cooled disc brakes.  
Long service life, no brake fade.  
Responsive pre-reduction design.

Multiple disc brake assemblies are sealed within the axle housing and continually bathed in oil. This design increases brake life up to five times over conventional drum brakes.  
The master cylinder is replenished automatically. Pre-reduction design multiplies braking torque 3 to 1 and provides smooth response operation.

Hand parking brake mechanically actuates service brake assemblies.

### Hydraulic System

Hydraulic valve has interchangeable flow control cartridges for precise flow regulation.  
Main hydraulic pump operates quietly.

Continuous fluid filtration.  
Heat preventive plumbing.  
O-ring seals at all critical high pressure points.

Lift, tilt and auxiliary control levers are closely coupled to the hydraulic valve, eliminating complex linkage and providing excellent response.  
Continuous fluid filtration within the power steering system and a fine 25 micron return line filter combine to more than double the system's filtering efficiency. A suction line screen protects the system from particles entering through the pump tank. A cleanable 10 micron filler cap/breather serves as the oil fill cap and protects the system from airborne contamination. New tilt cylinder design allows in truck packing replacement. Tubing is cadmium plated to reduce corrosion.

### Steering

Hydrostatic power steering.  
Double acting cylinder design provides equal and responsive steering rate.

Cast steel steer axle features integral double acting cylinder. Responsive steering rate and 5 turns lock-to-lock give operator added control. Pivot block axle mount allows axle articulation on rough floors.

### Uprights

All roller construction reduces friction, lowers energy consumption.  
I-section inner rails provide maximum section strength.  
Quick shim roller adjustment.  
All uprights accommodate 1/4" ID internal hosing for auxiliary functions.  
Two lateral thrust rollers off fork carriage.

Clark standard and triple stage uprights place cylinders behind the rails, giving vastly improved operator visibility. All uprights feature Clark nested rail construction. Upright rollers are shim adjustable without major disassembly. Tilt cylinder mounts are self-aligning to minimize side loading on cylinder rods, seals and packings. Hydraulic counterbalance valve in tilt circuit is designed to prevent cavitation. Load lowering control valve regulates lowering speed. Forks are upset forged hook type with fork retainers. ITA Class II carriage on ECS 17 through 25 models. Class III carriage on ECS 27/30 models. Flat black finish reduces glare, provides better visibility. High lift two stage and four stage uprights also available.

### Features and Options

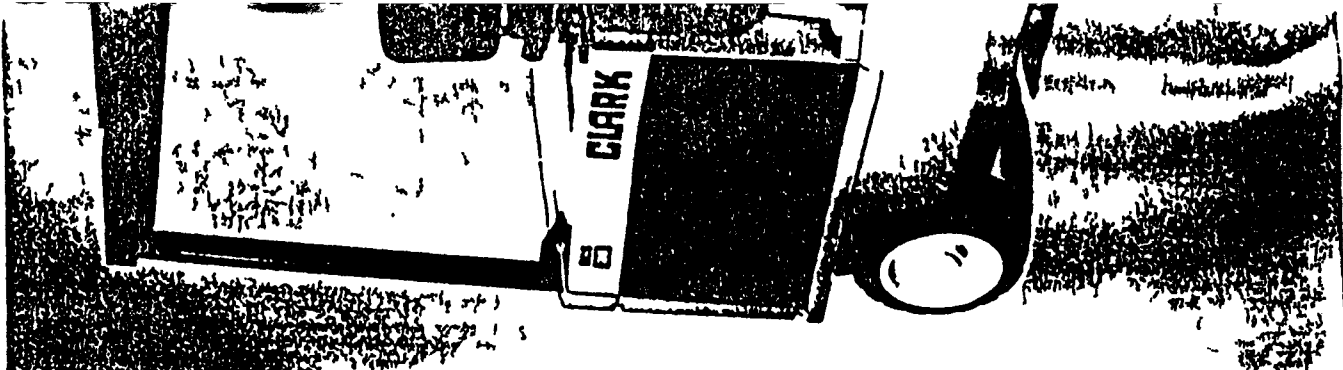
Standard equipment. Power steering, tilting steering pylon, overhead guard, 48 inch load backrest, electric horn. Curtis 933-3 battery discharge indicator with lift lockout, single auxiliary hydraulic function, brush is high visibility Clark green and black with white wheels, warning labels, operator manual. Attachments. Recommended Clark attachments include side shifters, carbon clamps, lateral clamps, push pulls, pushers, paper roll clamps and fork positioners. Refer to specific attachment specification sheets or consult your Clark dealer for details.

JEAN SUMMERS

SOUTHLINE EQUIPMENT COMPANY  
700 WEST CAVALCADE  
HOUSTON, TEXAS 77009

CLARK Material Handling  
Company

333 West Vine Street  
Lexington, KY 40507





Product Specifications

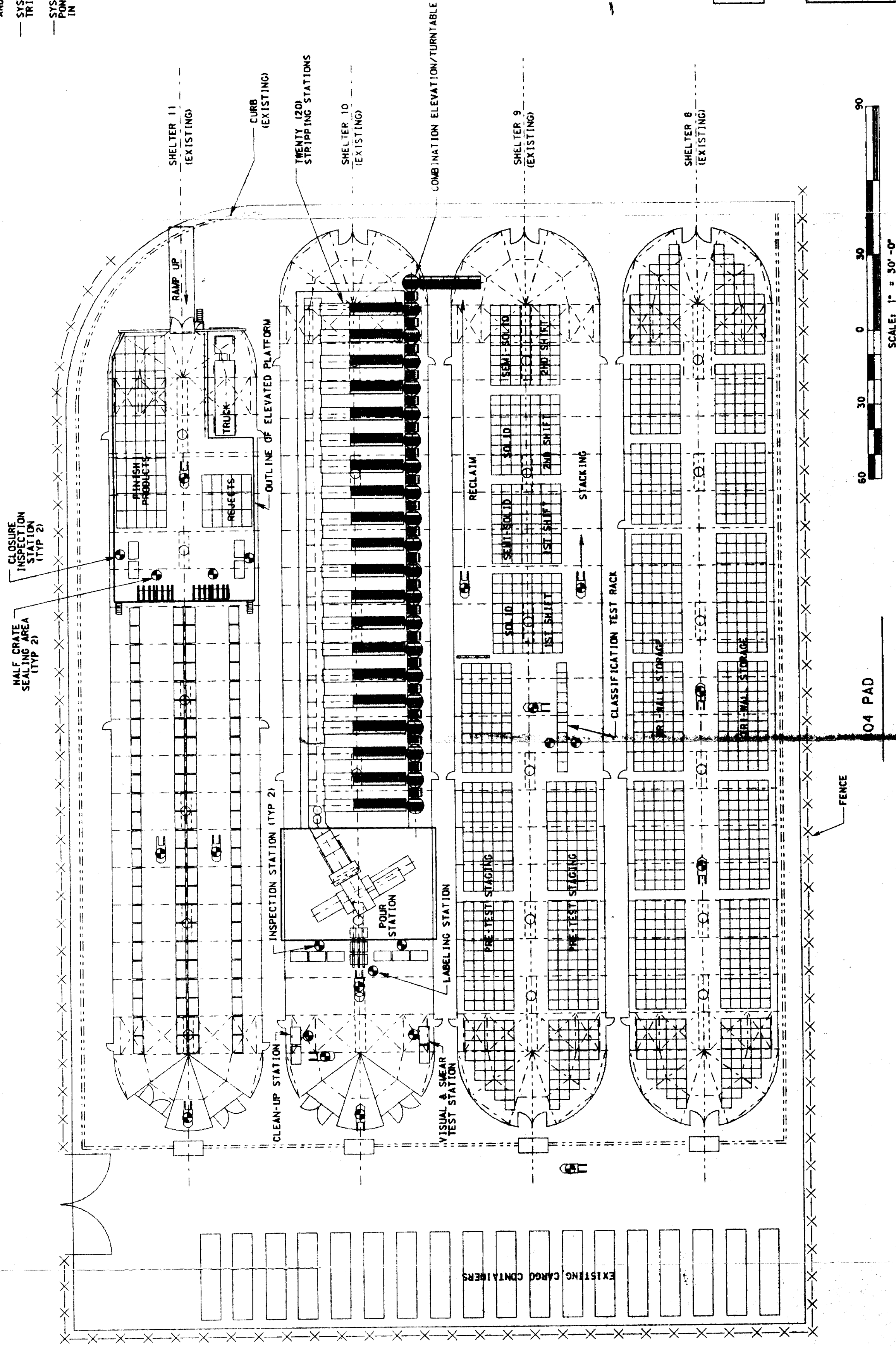
General Information		Manufacturer	Clark	Clark	Clark	Clark
1	Model	Ma f i c i d g i	TM12	TM15S	TM15	TM25
2	Load Capacity		2500/1250	3000/1500	3000/1500	5000/2500
3	Load Center	F k f e l o l o d C G	24/500	24/500	24/500	24
4	Power Unit	E l c i c	36- oil	36- oil	36- oil	36-volt
5	Operator Type		R d e Counterbalanced	R d e Counterbalanced	R d e Counterbalanced	R d e Counterbalanced
6	Tire Type	M h i- T e	Cush on   Pneumatic	Cush on   Pneumatic	Cush on   Pneumatic	Cush on
7	Wheels (x driven)		2x/1	2x/1	2x/1	2x/1
8	Upright	Max l i f t capacity	151	151	151	151
9	Lift height	L i f t h e i g h t p f e d s e	110	110	110	122
10	F e l t 2 t a g e		48	48	48	48
11	S i d l o k s e (T W L)		15x4x42	15x4x42	15x4x42	175 4 42
12	T i l t f o r w d / b a c k w d S i d p g h t		6/8	6/8	6/8	6/8
13	L e g h t f r k f i c e		69.5	69.5	76.2	78.45
14	Overall Dimensions		40.2   41.3	40.2   41.3	40.2   43.3	42.2
15	Width		77.0	77.0	77.0	83.0
16	H i g h t p r i g h t l o w d		158	158	158	170
17	H e i g h t p r i g h t e l e d e d		53.9	53	60.2	63.6
18	Turning Radius		14.4	14.4	14.4	14.65
19	Load Center Distance		68.0	69.4	74.7	78.35
20	Right Angle Stack Aisle					
21	Stability	Accord g to ANSI	Yes	Yes	Yes	Yes
22	Travel Speeds Max	With load	7.1	6.9	8.3	6.6
23	Without load		8.0	7.7	9.0	7.0
24	Lift/Lower Speeds Loaded	S i a d d	63/95	63/95	59/95	38/66
25	H L o		42/99	42/99	30/97	26/97
26	T p l e S t g e		60/85	60/85	56/85	38/63
27	S i a d a d		101/80	101/80	101/80	85/60
28	H L o		73/85	73/85	73/85	51/62
29	Triple S t g e		93/80	93/80	93/80	80/65
30	Serv ce Weight	110 S i d Upright M b a t t w t	6627	7158	7774	9305
31	Axle Loading	With load front	8035	8867	10 097	12993
32	With load ea		1092	1291	1177	1557
33	Witho t load fro t		3445	3359	4079	4350
34	Without load e		3182	3799	3695	5200
35	Tires	Nu m b e r o n l / e a	2/1	2/1	2/1	2/1
36	Wheelbase	S i z e f o n t	18 7 12 12   18 7 8 16PR	18 7 12 12   18 7 8 16PR	18 8 12 12   18 9 8 16PR	18 9 12 12
37	Track	S i z e e a r	18 7 12 12   18 7 8 16PR	18 7 12 12   18 7 8 16PR	18 7 12 12   N/A	18 6 12 12 URE
38	Ground Clearance	F r o n t c u s h i o n	46.0	46.0	52.7	52.7
39	Brakes	F r o n t p n e u m t i c	33.3	33.3	33.3	33.3
40	Steering	M i n i m m w i t h l o a d	33.9	33.9	33.9	N/A
41	Battery	A l c e t e o f w h e e l b a s e	2.4	2.4	2.4	2.4
42	Motors Controls	S e r v i c e	3.6	3.4	3.2	3.2
43	Drive motor cont of	P a r k g	d s c	d s c	d i s c	d i s c
44	Hydraulic motor cont of		lever actuated	lever actuated	lever actuated	lever actuated
45	Hydraulic Pressure		Hydrostatic	Hydrostatic	Hydrostatic	Hydrostatic
46	For ft chime ts		lead acid	lead acid	lead-ac d	lead-acid
47	Capacity (6 hr t ) m		24.3	24.3	38.9	38.9
48	W r i g h t m m m		1650	1650	2590	2590
49	Drive motor dia		6.6	6.6	6.6	6.6
50	Hydra lic moto d a		7.2	7.2	7.2	7.2
51	Drive motor cont of		SCR	SCR	SCR	SCR i n f r n l e
52	Speed cont of		s o l d s t a t e	s o l d s t a t e	s o l d s t a t e	s o l d s t a t e
53	Hyd lic motor cont of		contactor	contactor	contactor	contactor
54	For ft chime ts		Adjustable	Adjustable	Adjustable	Adjustable

See Upright Table Contact Clark Repr sentative for additional lift heights.  
2 Specifications given for the truck with the most commonly requested upright.

GENERAL OBSERVATIONS:

1. THE FOLLOWING SYSTEMS HAVE NOT BEEN INCORPORATED INTO THE LAYOUT AT THIS TIME.

- COMPLETE PROCESSING TRAIN
- WASTE HANDLING SYSTEM
- WASTE SHREDDING/COMPACTION SYSTEM
- NEW EMPTY HALF CRATE AND FULL CRATE HANDLING SYSTEM
- SYSTEM FOR HANDLING TRI-WALLS FROM METAL
- SYSTEM FOR HANDLING PONDCRETE/SALTCRETE POURED IN HALF CRATES



PRELIMINARY

SOLAR POND/POD/CONCRETE STABILIZATION PROJECT  
MATERIAL HANDLING STUDY

PAD 904 - EQUIPMENT ARRANGEMENT  
PLAN FOR STRIPPING TRI-WALLS  
AND MANUAL MATERIAL HANDLING

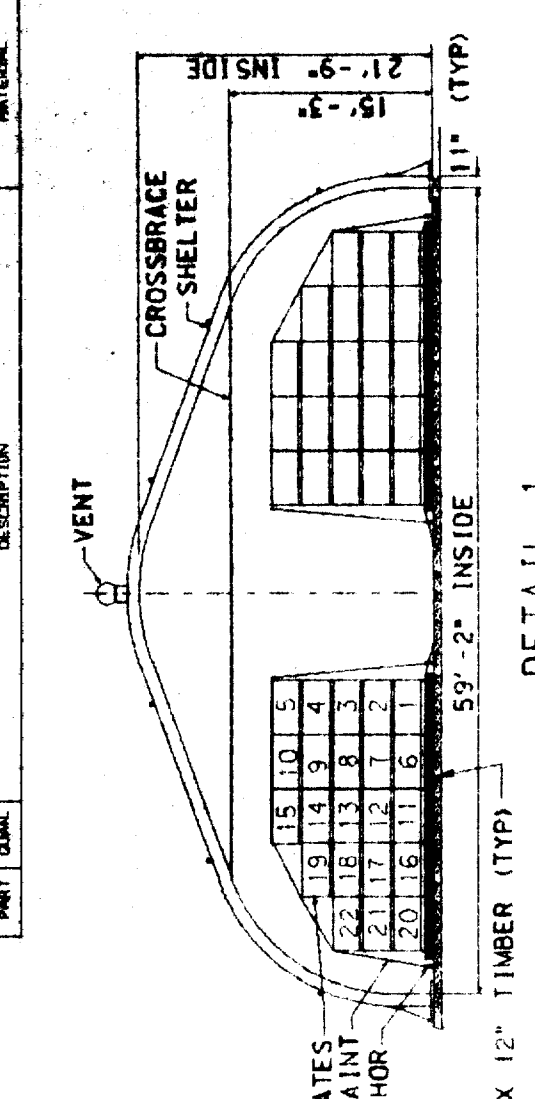
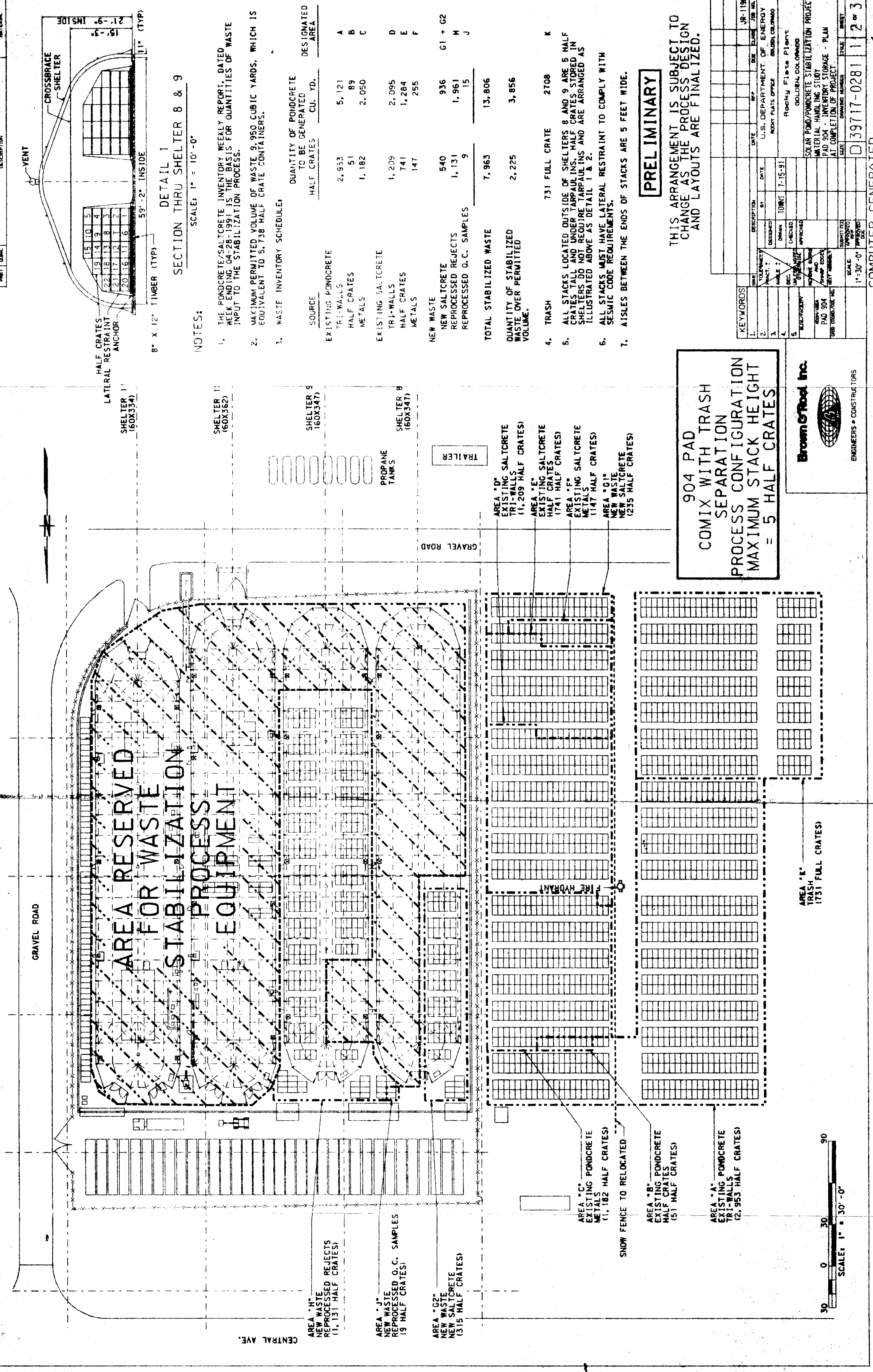
DRAWING NO. 2.2.2.2-1



04 PAD

FENCE





**NOTES:**

1. THE PONDCRETE/SALTCRETE INVENTORY WEEKLY REPORT, DATED WEEK ENDING 04-28-1991 IS THE BASIS FOR QUANTITIES OF WASTE INPUT TO THE STABILIZATION PROCESS.
2. MAXIMUM PERMITTED VOLUME OF WASTE 9,950 CUBIC YARDS, WHICH IS EQUIVALENT TO 5,738 HALF CRATE CONTAINERS.
3. WASTE INVENTORY SCHEDULE:

SOURCE		QUANTITY OF PONDCRETE TO BE GENERATED		DESIGNATED AREA
		HALF CRATES	CU. YD.	
EXISTING PONDCRETE				
TRI-WALLS	2,953	5,121		A
HALF CRATES	51	89		B
METALS	1,182	2,050		C
EXISTING SALTCRETE				
TRI-WALLS	1,209	2,095		D
HALF CRATES	741	1,284		E
METALS	147	255		F
NEW WASTE				
NEW SALTCRETE	540	936		G1 + G2
REPROCESSED REJECTS	1,131	1,961		H
REPROCESSED O.C. SAMPLES	9	15		J
TOTAL STABILIZED WASTE		7,963	13,806	
QUANTITY OF STABILIZED WASTE OVER PERMITTED VOLUME		2,225	3,856	
4. TRASH		731 FULL CRATE	2708	K

THIS ARRANGEMENT IS SUBJECT TO CHANGE AS THE PROCESS DESIGN AND LAYOUTS ARE FINALIZED.

**PRELIMINARY**

KEYWORDS: 1. 2. 3. 4. 5. 6. 7.

DATE: 04-28-91

BY: [Signature]

DESIGNED: [Signature]

DRAWN: [Signature]

CHECKED: [Signature]

APPROVED: [Signature]

SCALE: 1" = 30'-0"

COMPUTER GENERATED NO MANUAL CHANGES ALLOWED

**904 PAD COMIX WITH TRASH SEPARATION PROCESS CONFIGURATION MAXIMUM STACK HEIGHT = 5 HALF CRATES**

**Brown & Root Inc.**

ENGINEERS • CONSTRUCTORS

SOURCE		QUANTITY OF PONDCRETE TO BE GENERATED		DESIGNATED AREA
		HALF CRATES	CU. YD.	
EXISTING PONDCRETE				
TRI-WALLS	2,953	5,121		A
HALF CRATES	51	89		B
METALS	1,182	2,050		C
EXISTING SALTCRETE				
TRI-WALLS	1,209	2,095		D
HALF CRATES	741	1,284		E
METALS	147	255		F
NEW WASTE				
NEW SALTCRETE	540	936		G1 + G2
REPROCESSED REJECTS	1,131	1,961		H
REPROCESSED O.C. SAMPLES	9	15		J
TOTAL STABILIZED WASTE		7,963	13,806	
QUANTITY OF STABILIZED WASTE OVER PERMITTED VOLUME		2,225	3,856	
4. TRASH		731 FULL CRATE	2708	K



**Brown & Root Inc.**



**ENGINEERS • CONSTRUCTORS**

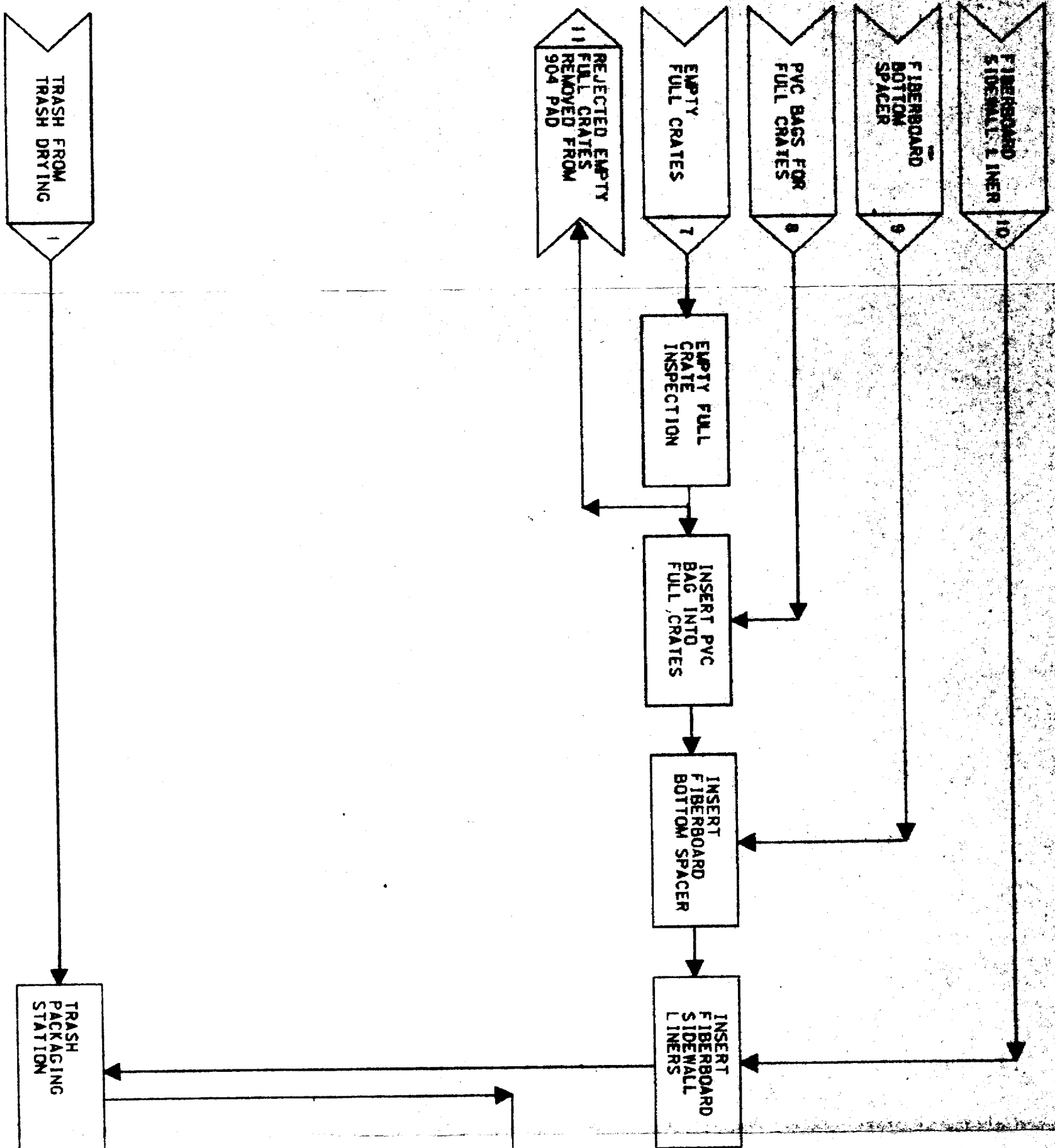
THIS ARRANGEMENT IS SUBJECT TO  
CHANGE AS THE PROCESS DESIGN  
AND LAYOUTS ARE FINALIZED.

COMPUTER GENERATED  
NO MANUAL CHANGES ALLOWED





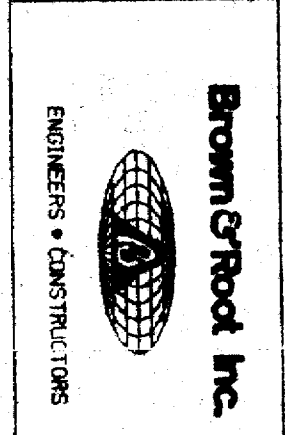




TAG	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
STREAM	TRASH														
UNITS	TONS														
HOURLY															
TOTAL															

TAG	16	17	18	19	20	21	22	23	24
STREAM	SWEAR TEST TRASH F/C RATE SUPPLIES	SWEAR TEST FIBERBOARD TOP INSERTS	FIBERBOARD ADHESIVE TAPE	CLOSURE GLUE	CLOSURE FULL CRATE LIDS	CLOSURE FULL CRATE LIDS	CLOSURE FULL CRATE LIDS	ACCEPTABLE TRASH	SWEAR TEST TRASH
UNITS	EACH	EACH	EACH	ROLLS	GALLONS	EACH	10 PENNY NO. / 20 PENNY NO.	HALF CRATES FULL CRATES	
HOURLY									
TOTAL	7	731	66	61	731	62,866/ 3,848	731	731	?

NOTES:  
1. THE POND/CRATE/SALT/TESTE INVENTORY WEEKLY REPORT, DATED WEEK ENDING 04-28-1991 IS THE BASIS FOR QUANTITIES OF WASTE INPUT TO THE STABILIZATION PROCESS.  
2. REFER TO D39717-0191 SHEET 2 OF 2 FOR TRASH HANDLING.  
3. STREAM NOTE ASSUMES 20% OF FULL CRATES WILL REQUIRE TESTING WHICH HAS NOT BEEN DETERMINED.  
AVERAGE HOURLY RATE



KEYWORDS: 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.

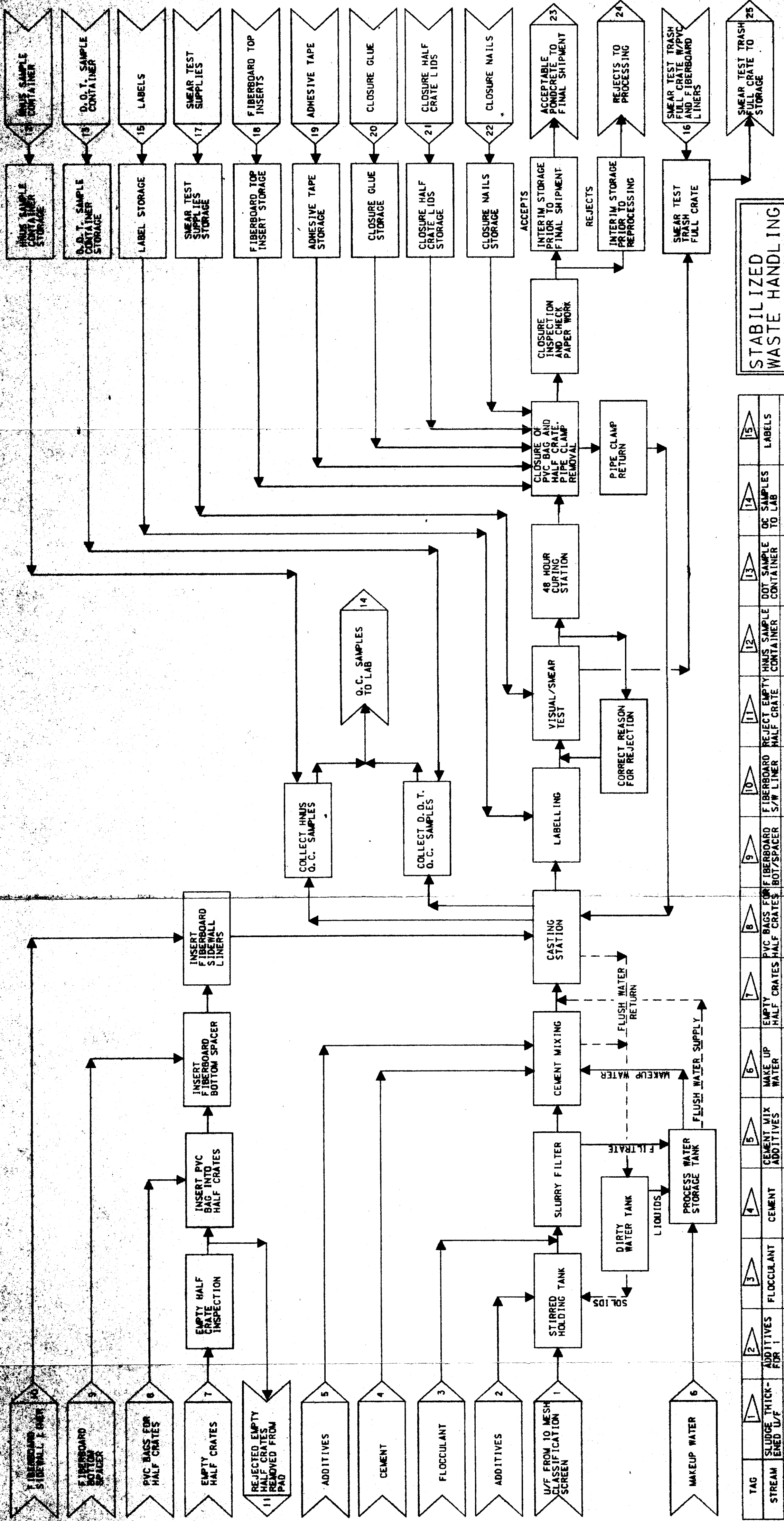
U.S. DEPARTMENT OF ENERGY  
Rocky Flats Plant  
GOLDEN, COLORADO

DATE: 09-11-91  
BY: [Signature]  
JOB NO. JR-1198

SCALE: NONE  
DRAWING NUMBER: D39717-0191  
SHEET: 2 OF 2

COMPUTER GENERATED  
NO MANUAL CHANGES ALLOWED





TAG	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
STREAM	SLUDGE THICK- ENED U/F	ADDITIVES FOR 1	FLOCCULANT	CEMENT	CEMENT MIX ADDITIVES	MAKE UP WATER	EMPTY HALF CRATES	PVC BAGS FOR FIBERBOARD	FIBERBOARD S/W SPACER	FIBERBOARD DOT SAMPLE CONTAINER	DOT SAMPLE CONTAINER	DOT SAMPLE CONTAINER	DOT SAMPLE CONTAINER	DOT SAMPLE CONTAINER	DOT SAMPLE CONTAINER
UNITS	TONS	TONS	TONS	TONS	TONS	GALLONS	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH
* HOURLY							9.4	9.36	9.36	0.42	7.49	1.87	9.36	9.36	9.36
TOTAL							7999	7963	7963	36	6370	1593	7963	7963	7963

## NOTES:

1. THE PONDCRETE/SALTCTETE INVENTORY WEEKLY REPORT, DATED WEEK ENDING 04-28-1991, IS THE BASIS FOR QUANTITIES OF WASTE INPUT TO THE STABILIZATION PROCESS.
2. REFER TO D3917-0191 SHEET 2 OF 2 FOR TRASH HANDLING.

• AVERAGE HOURLY RATE

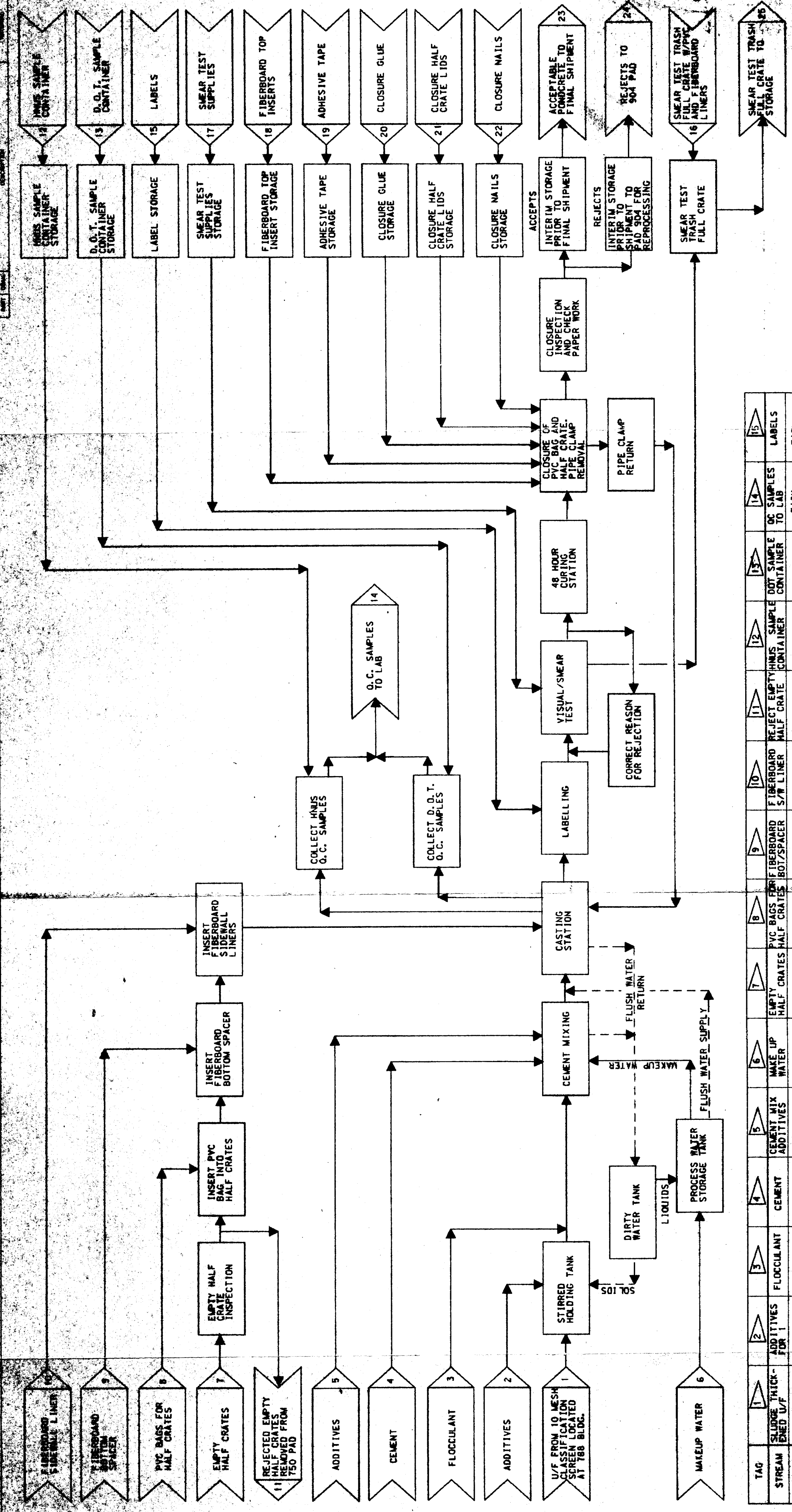
Brown &amp; Root Inc.



ENGINEERS • CONSTRUCTORS

COMPUTER GENERATED  
NO MANUAL CHANGES ALLOWED





UNITS	TONS	TONS	TONS	TONS	GALLONS	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH
-------	------	------	------	------	---------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------







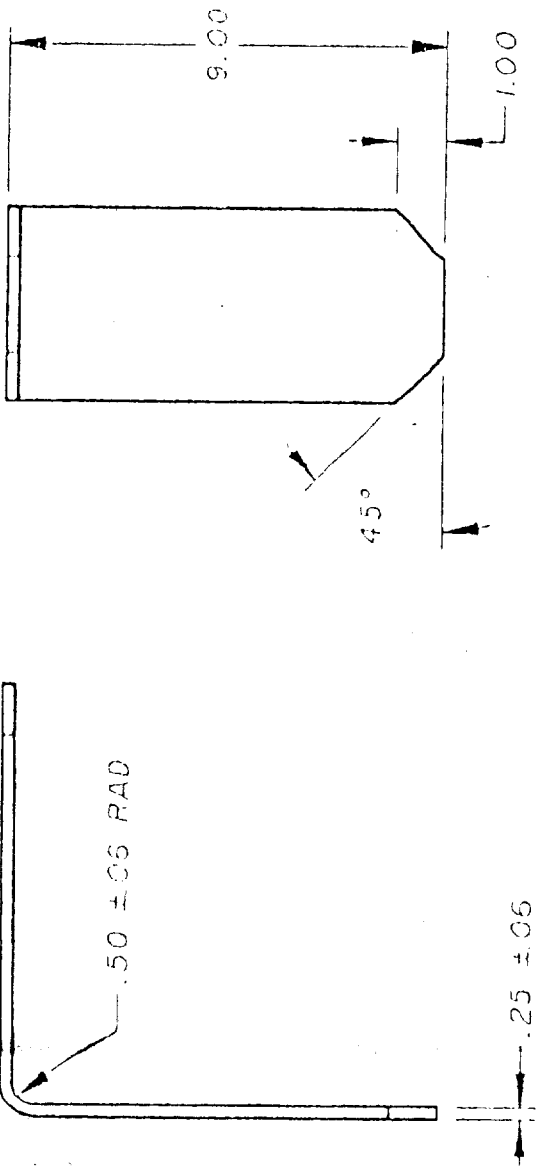
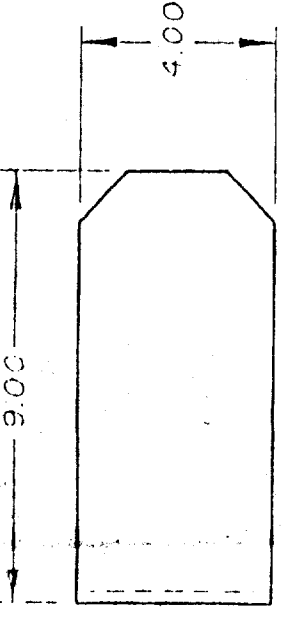


RECEIVED  
BROWN & ROOT  
MAY 29 1991  
EG&G ROCKY FLATS  
SOLAR POND/CONDUCTOR  
WASTE DISPOSAL PROJECT

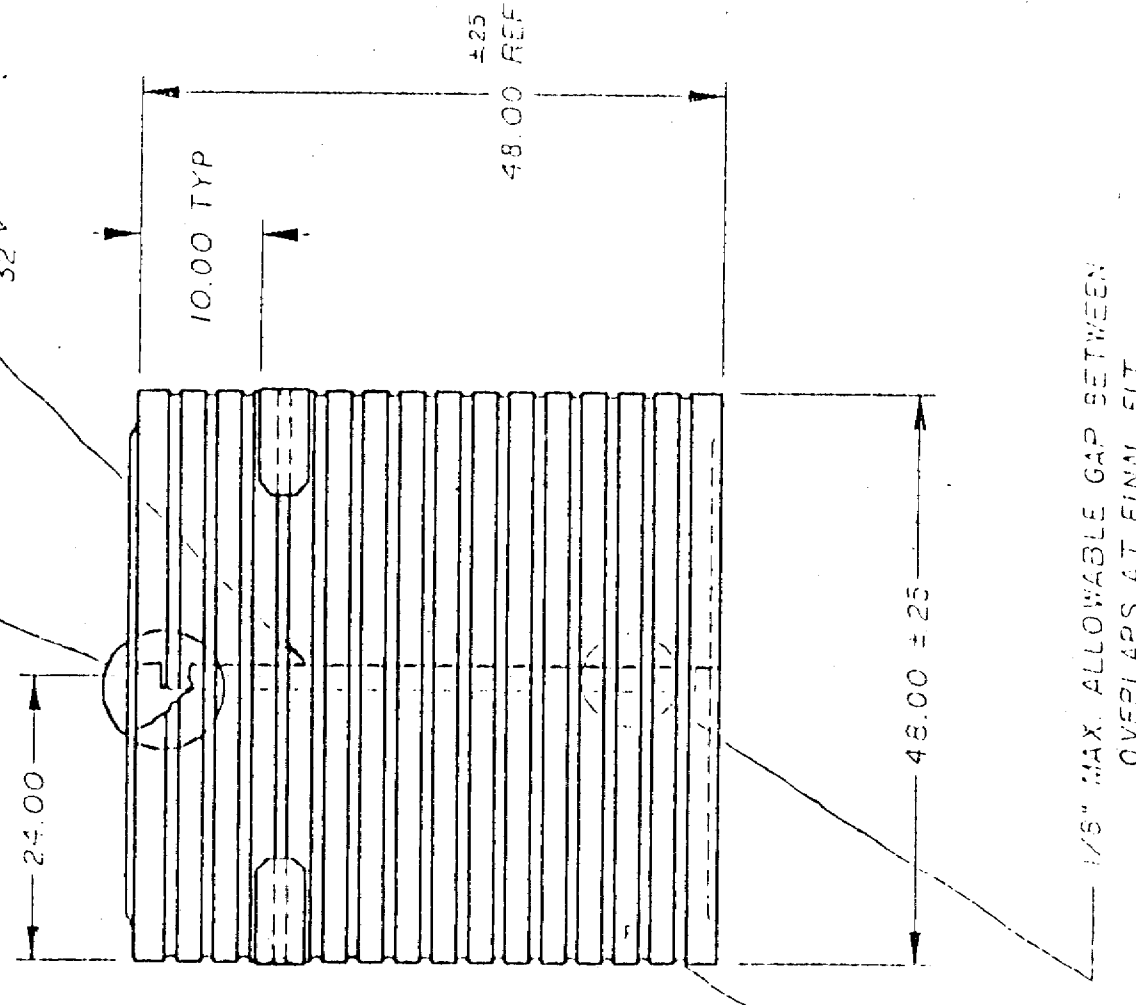
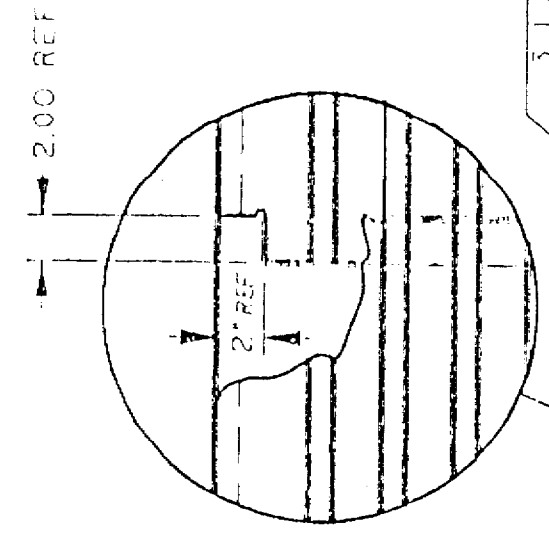
PART	QTY	DESCRIPTION	MATERIAL
1	1	WASTE CONTAINER ASSEMBLY	
2	1	SHEET 14 GA. X 48.0" X 134.0" LG	ASTM-LCS-A366
3	4	BAR 1/4" X 4.00" X 18 1/8" LG.	ASTM-LCS-A366
5	2	SHEET 14 GA. X 47.5" X 83.5" LG.	ASTM-LCS-A366
6	1	COUPLING 3/4-14 THD. FULL	CS

NOTE:

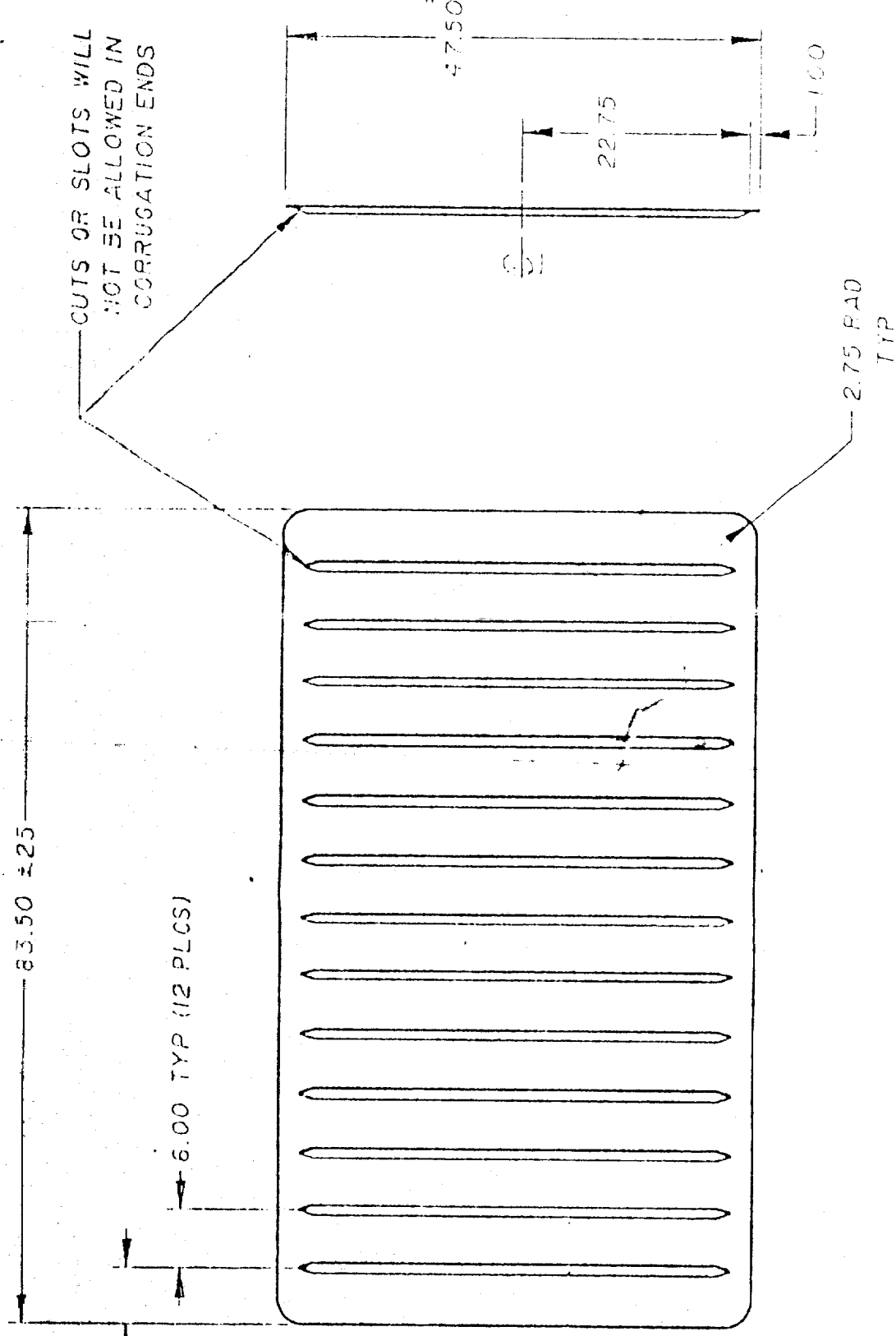
- ASSEMBLY NO. 2 SHALL BE CONSTRUCTED OF NO MORE THAN THREE SIZE PIECES WITH NO MORE THAN THREE VERTICAL SEAMS AND NO HORIZONTAL SIDE SEAMS.
- TOP LID IS TO BE SHIPPED LOOSE.
- LAPPED BOX SEAMS SHALL BE CONTINUOUSLY WELDED ON THE OUTSIDE. SKIP WELDED ON THE INSIDE, AND SHALL BE AIR LEAK TIGHT.
- STEEL STAMP MANUFACTURER'S NAME, ROCKWELL STD. SX-231, DATE OF MANUFACTURE, AND SERIAL NO. ON RIGHT LIFTING LOOP ON OPPOSITE SIDES OF EACH CONTAINER. LOCATE IDENTIFICATION ON EACH LIFTING LOOP AS NOTED.
- REMOVE WELD SPATTER.
- BOTTOM SHALL BE CONTINUOUSLY WELDED EXTERNALLY, AND SKIP WELDED INTERNALLY.
- EDGES OF LID AND BOTTOM PIECES SHALL BE PARALLEL AND ALSO PERPENDICULAR WITH AN ALLOWABLE DRIFT OF  $\pm 3/32$  IN. AND SQUARE WITHIN  $\pm 3/32$  IN.
- BODY CORRUGATIONS SHALL BE PARALLEL WITHIN  $\pm 3/32$  IN.
- LID AND BOTTOM CORRUGATIONS SHALL BE PERPENDICULAR TO EDGE WITHIN  $\pm 1/8$  IN.
- MAXIMUM ALLOWABLE STEP AT BOTTOM END JOINTS SHALL BE  $1/4$ ".
- MAXIMUM ALLOWABLE STEP AT TOP END JOINTS SHALL BE  $1/8$ ".
- A VINYL TAPE, CAPABLE OF WITHSTANDING 3 YEARS OF OUTDOOR EXPOSURE (SCOTCH BRAND NO. 472 OR EQUIVALENT) SHALL BE USED TO MASK OFF THE AREAS SHOWN IN THE TAPING DETAIL. TAPE SHALL NOT BE TORN OR SCRATCHED SUCH THAT BARE METAL WILL BE EXPOSED TO THE ATMOSPHERE. TAPE TO BE WRAPPED AROUND THE ENTIRE BOX BODY AND TAPE EDGES AS SHOWN.



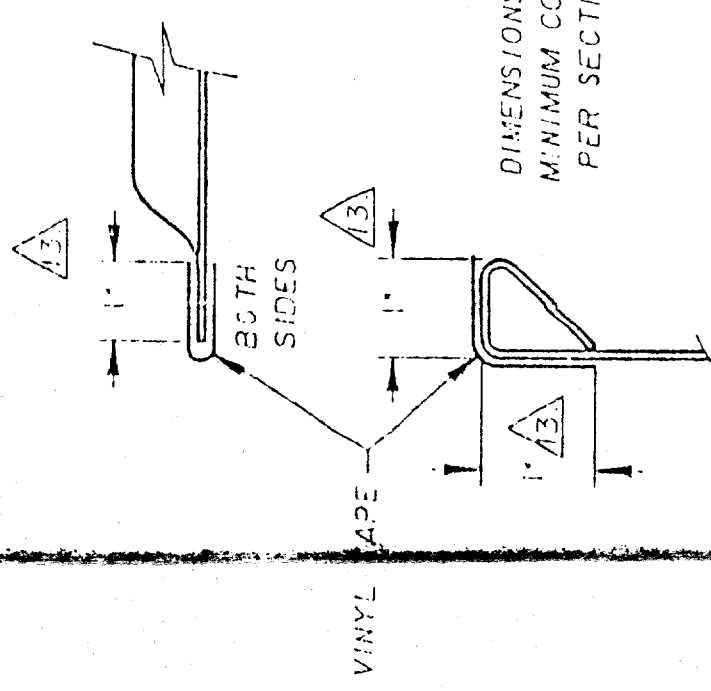
3 LIFTING LOOP  
SCALE: 1/4" = 1"



CONTROLLED DRAWING  
EG&G ROCKY FLATS  
SOLAR POND/CONDUCTOR  
WASTE DISPOSAL PROJECT  
DESIGNED BY: J. H. B. 11/13/81  
CHECKED BY: J. H. B. 12/01/82  
DATE: 12/01/82  
APPROVED BY: J. H. B. 12/01/82  
REMOVE BURRS  
SHARP EDGES  
NEXT ASSEMBLY

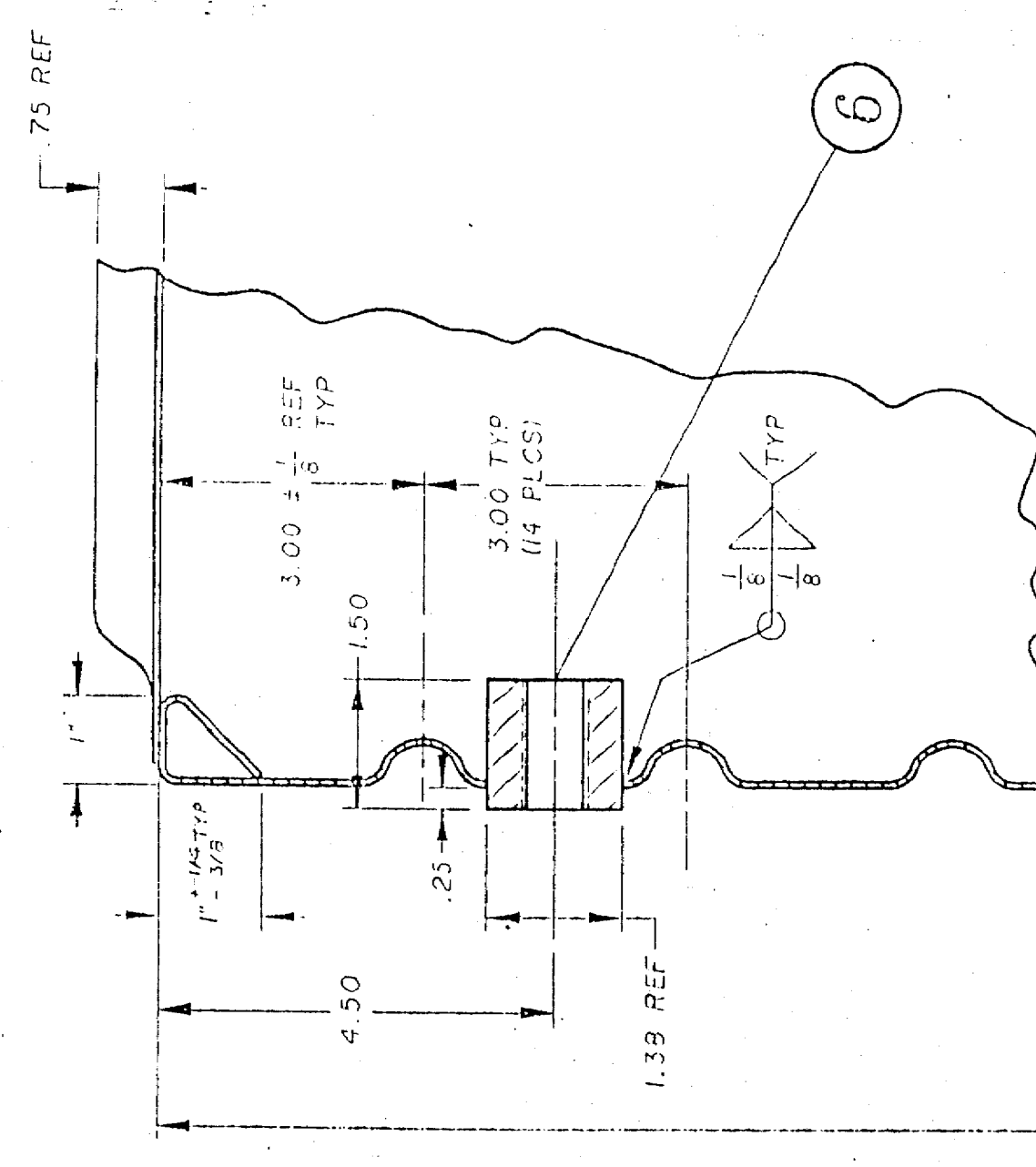


5 LID AND BOTTOM DETAILS  
SCALE: 1/16" = 1"



DIMENSIONS SHOW  
MINIMUM COVERAGE  
PER SECTION 3.7

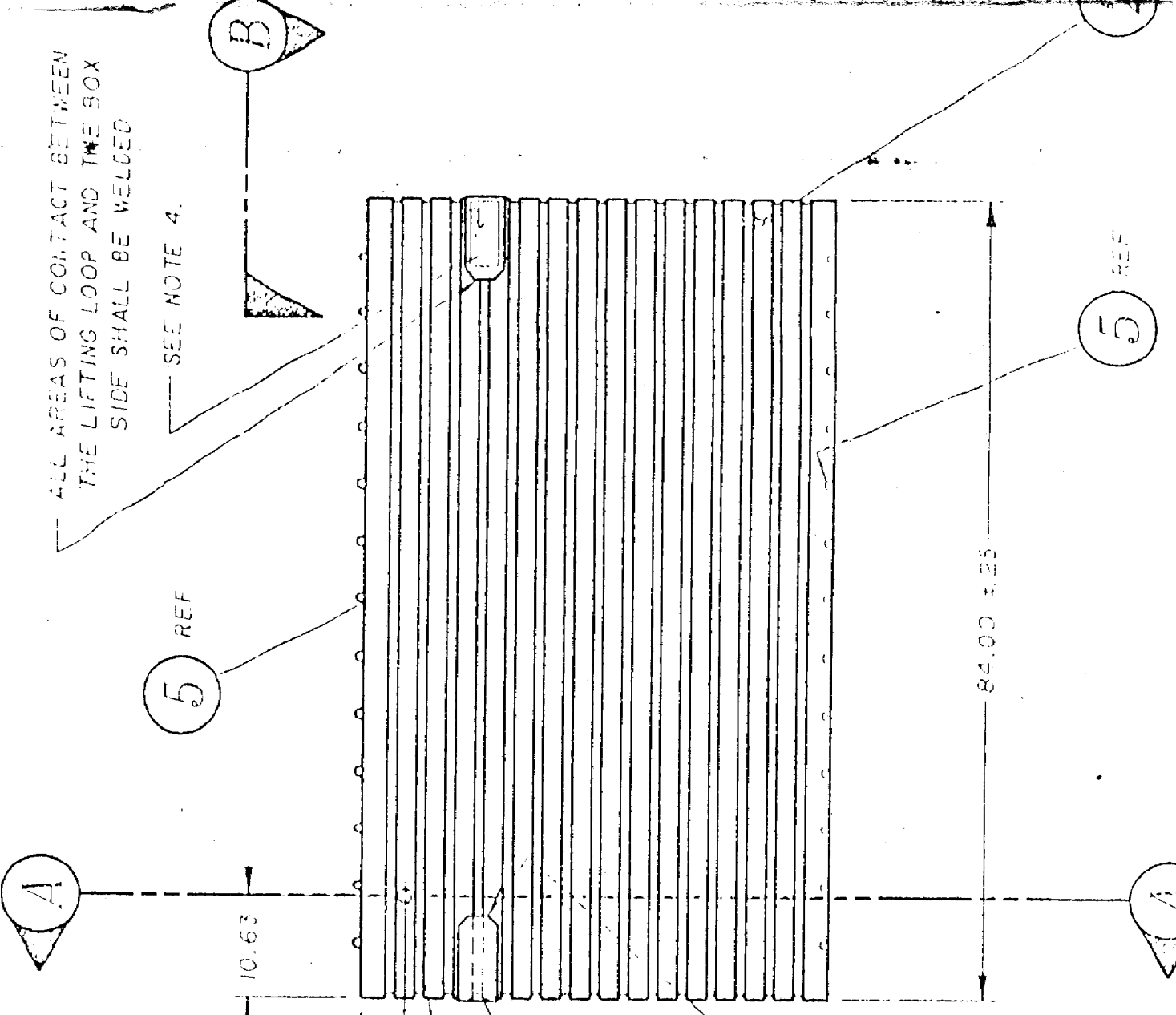
TAPING DETAIL



NOTE - RADIUS WELD  
PARAGRAPH 3.2.2

FROM END OF BOX RADIUS  
ALONG TOP BOTTOM AND  
ANGLED CORNER  
EDGE OF LIFTING LOOP

PARTIAL VIEW B  
BOX CORNER RADIUS



1 WASTE CONTAINER ASSEMBLY 2  
SCALE: NONE

SECTION A-A  
SCALE: 1/2"



NOTE  
(NO WELD)

RETAIN COPY CONTROLLED DRAWING

COMPUTER GENERATED  
NO MANUAL CHANGES ALLOWED

26383-2 N 2 of 4

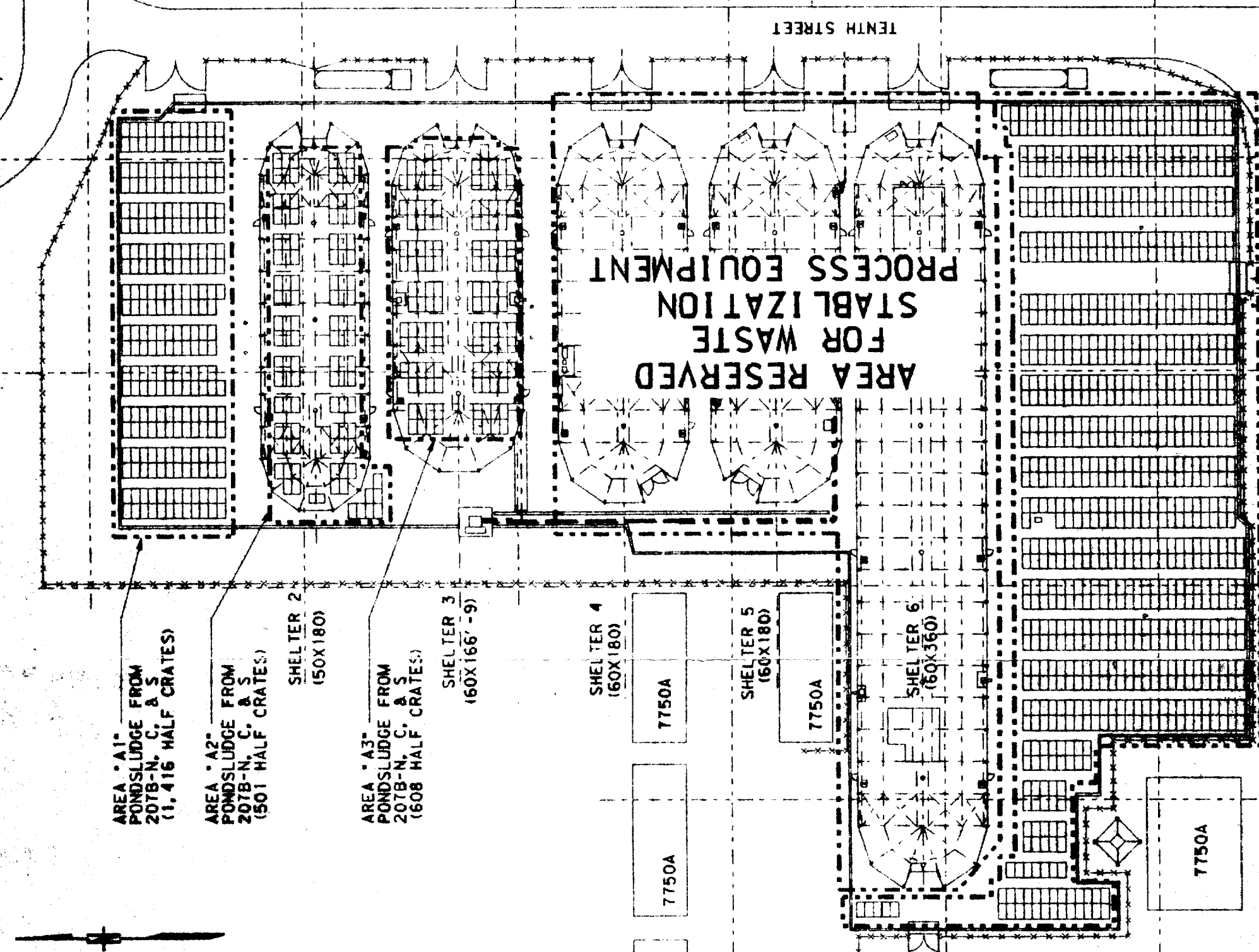
ASSEMBLY NO. 2

Rockwell International  
ENGINEERING PLANT  
GOLDEN, COLORADO 80601

U.S. DEPARTMENT OF ENERGY  
PO BOX 16000  
GOLDEN, COLORADO 80601

EG&G ROCKY FLATS  
SOLAR POND/CONDUCTOR  
WASTE DISPOSAL PROJECT

RECEIVED  
BROWN & ROOT  
MAY 29 1991



NOTES:

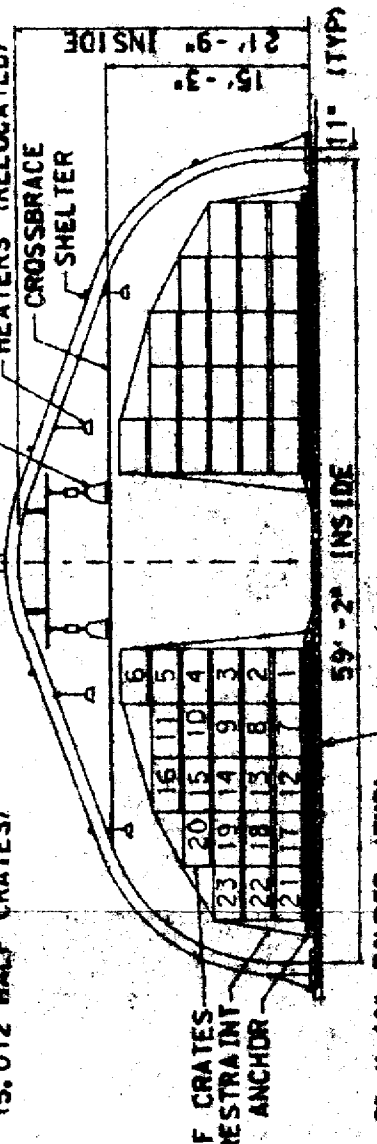
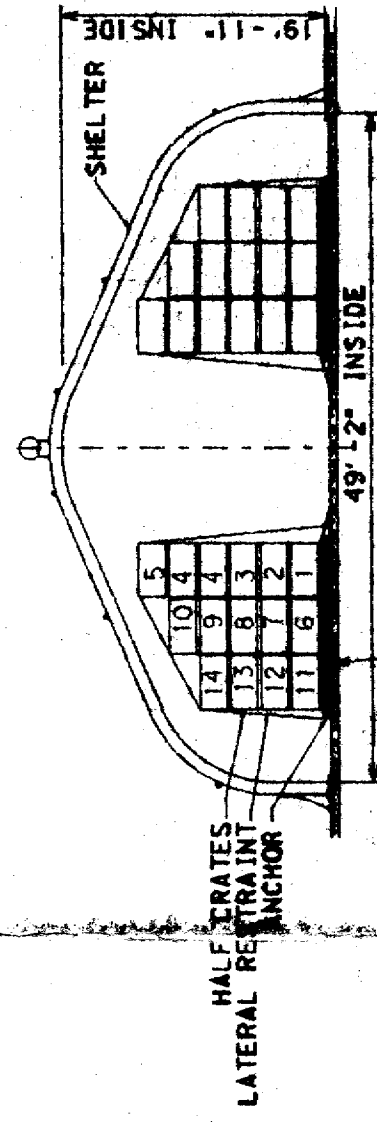
1. THE WESTON SOLAR POND SAMPLING REPORT, DATED JULY 1991, IS THE BASIS FOR QUANTITIES OF WASTE INPUT TO THE STABILIZATION PROCESS.
2. MAXIMUM PERMITTED VOLUME OF WASTE 14,000 CUBIC YARDS, WHICH IS EQUIVALENT TO 8073 HALF CRATE CONTAINERS.
3. WASTE INVENTORY SCHEDULE:

SOURCE	QUANTITY OF POND/CRATE TO BE GENERATED	DESIGNATED AREA
POND SLUDGE FROM 207B-N, C, & S	17,145	A1-A2-A3-A4-A5
POND SLUDGE FROM 207A	738	B
CLARIFIER TANK BOTTOMS	151	C
POND SLUDGE & LIQUID FROM 207C	1,669	D
EVAPORATOR BOTTOMS	908	E
TOTAL STABILIZED WASTE	20,611	
QUANTITY OF STABILIZED WASTE OVER PERMITTED VOLUME	12,538	
4. TRASH  
3 FULL CRATES 10 F
5. ALL STACKS LOCATED OUTSIDE OF SHELTERS 2 AND 3 ARE 6 HALF CRATES TALL AND UNDER TARPULINS. HALF CRATES STORED IN SHELTERS DO NOT REQUIRE TARPULINS AND ARE ARRANGED AS ILLUSTRATED ABOVE AS DETAIL 1 & 2.
6. ALL STACKS MUST HAVE LATERAL RESTRAINT TO COMPLY WITH SEISMIC CODE REQUIREMENTS.
7. AISLES BETWEEN THE ENDS OF STACKS ARE 5 FEET WIDE.

PRELIMINARY

THIS ARRANGEMENT IS SUBJECT TO CHANGE AS THE PROCESS DESIGN AND LAYOUTS ARE FINALIZED.

750 PAD  
HIGH WATER RATIO  
PROCESS CONFIGURATION  
MAXIMUM STACK HEIGHT  
= 6 HALF CRATES



KEYWORDS	DESCRIPTION	DATE	BY	DATE	BY
1. SOLAR POND/CRATE STABILIZATION PROJECT	DESIGNED	03-10-91	DR-1130		
2. MATERIAL HANDLING STUDY	DRAWN				
3. PAD 750 - INVENTORY STORAGE - PLAN	CHECKED				
4. AT PROJECT COMPLETION	APPROVED				
5. SOLAR POND/CRATE STABILIZATION PROJECT					

U.S. DEPARTMENT OF ENERGY  
ROCKY FLATS OFFICE  
Rocky Flats Plant  
GOLDEN, COLORADO

SCALE: 1" = 10'-0"

COMPUTER GENERATED  
NO MANUAL CHANGES ALLOWED







PART	QUANTITY	DESCRIPTION	MATERIAL
------	----------	-------------	----------

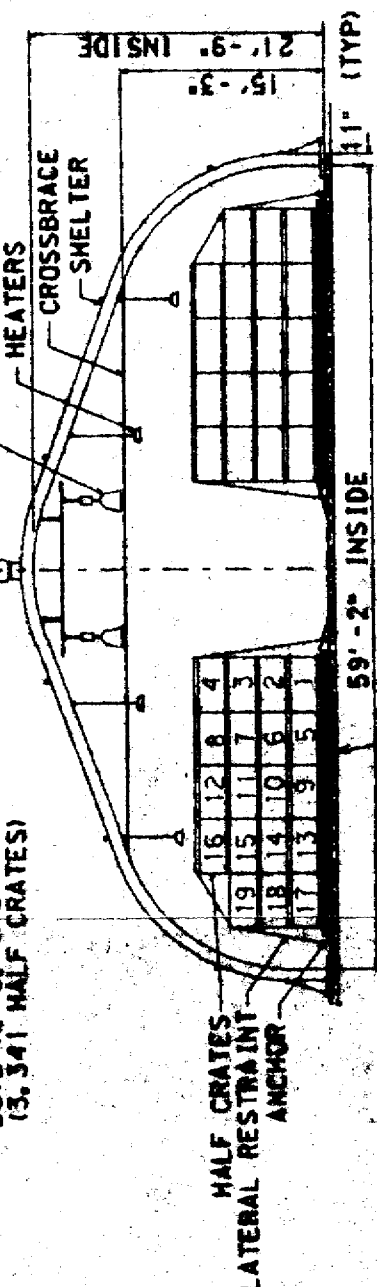
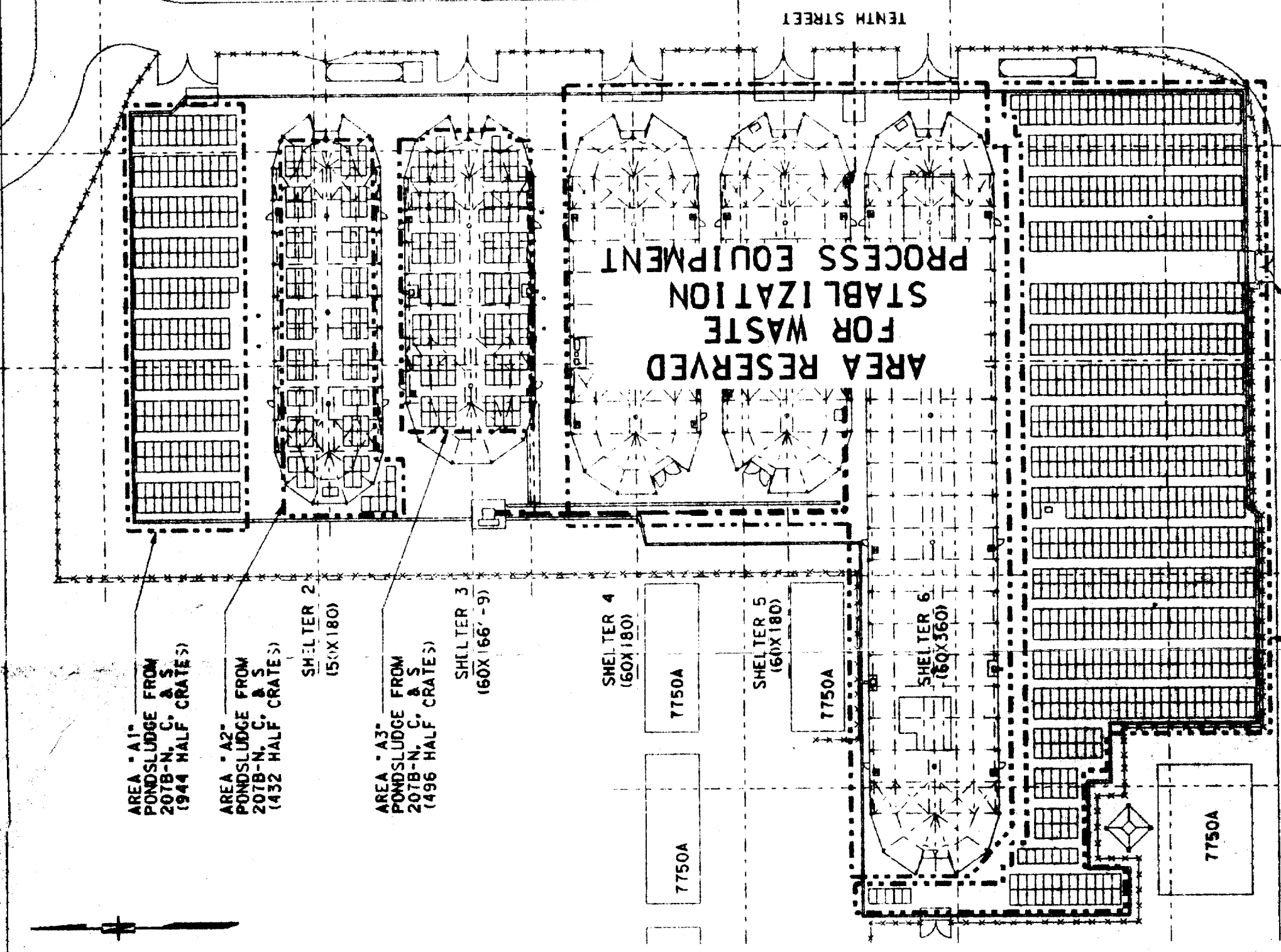
NOTES:

1. THE WESTON SOLAR POND SAMPLING REPORT, DATED JULY 1991, IS THE BASIS FOR QUANTITIES OF WASTE INPUT TO THE STABILIZATION PROCESS.
  2. MAXIMUM PERMITTED VOLUME OF WASTE 14,000 CUBIC YARDS, WHICH IS EQUIVALENT TO 8075 HALF CRATE CONTAINERS.
  3. WASTE INVENTORY SCHEDULE:
- | SOURCE   | QUANTITY OF POND/CONCRETE TO BE GENERATED HALF CRATES | CU. YD. | DESIGNATED AREA |
|--|---|---------|-----------------|
| POND SLUDGE FROM 207B-N, C, & S                    | 17,145  | 29,730  | A1-A2-A3-A4-A5  |
| POND SLUDGE FROM 207A                              | 738   | 1,279   | B               |
| CLARIFIER TANK BOTTOMS                             | 151   | 262     | C               |
| POND SLUDGE & LIQUID FROM 207C                     | 1,669   | 2,894   | D               |
| EVAPORATOR BOTTOMS                                 | 908   | 1,574   | E               |
| TOTAL STABILIZED WASTE                             | 20,611  | 35,739  |                 |
| QUANTITY OF STABILIZED WASTE OVER PERMITTED VOLUME | 12,538  | 21,739  |                 |
| TRASH  | 3 FULL CRATES   | 10      | F               |
4. ALL STACKS LOCATED OUTSIDE OF SHELTERS 2 AND 3 ARE 4 HALF CRATES TALL AND UNDER TARPULINS. HALF CRATES STORED IN SHELTERS DO NOT REQUIRE TARPULINS AND ARE ARRANGED AS ILLUSTRATED ABOVE AS DETAIL 1 & 2.
  6. ALL STACKS MUST HAVE LATERAL RESTRAINT TO COMPLY WITH SEISMIC CODE REQUIREMENTS.
  7. AISLES BETWEEN THE ENDS OF STACKS ARE 5 FEET WIDE.

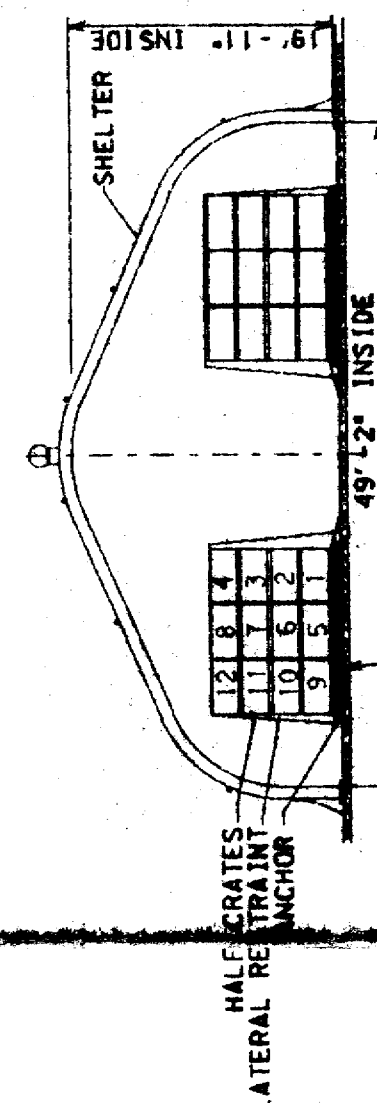
PRELIMINARY

THIS ARRANGEMENT IS SUBJECT TO CHANGE AS THE PROCESS DESIGN AND LAYOUTS ARE FINALIZED.

750 PAD  
HIGH WATER RATIO  
PROCESS CONFIGURATION  
MAXIMUM STACK HEIGHT  
= 4 HALF CRATES



DETAIL 1  
SECTION THRU SHELTER 1  
SCALE: 1" = 10'-0"



DETAIL 2  
SECTION THRU SHELTER 2  
SCALE: 1" = 10'-0"

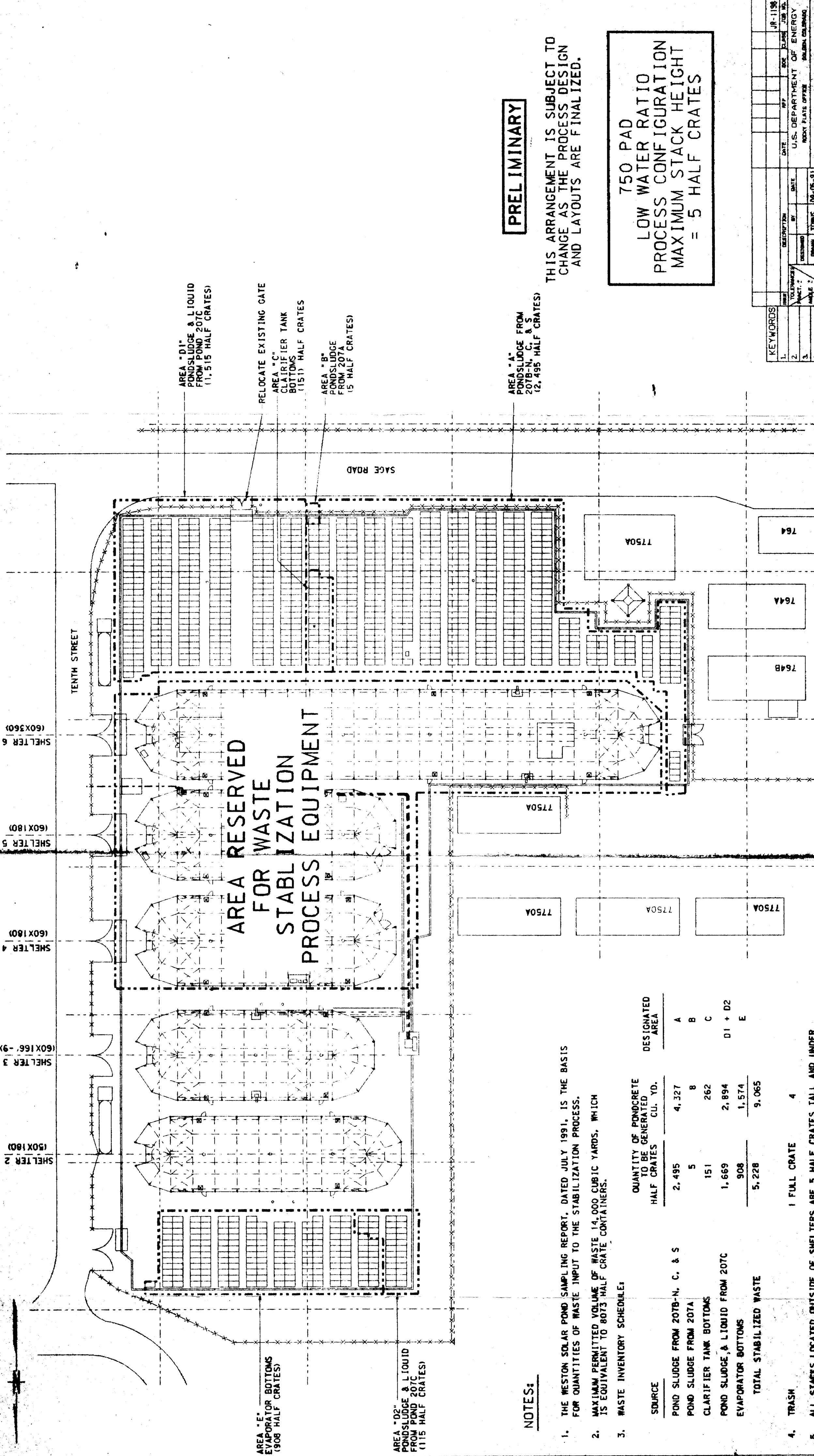
KEYWORDS	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	32.	33.	34.	35.	36.	37.	38.	39.	40.	41.	42.	43.	44.	45.	46.	47.	48.	49.	50.	51.	52.	53.	54.	55.	56.	57.	58.	59.	60.	61.	62.	63.	64.	65.	66.	67.	68.	69.	70.	71.	72.	73.	74.	75.	76.	77.	78.	79.	80.	81.	82.	83.	84.	85.	86.	87.	88.	89.	90.	91.	92.	93.	94.	95.	96.	97.	98.	99.	100.																		
	TOLERANCES	DESIGNED BY	DATE	DESCRIPTION	DATE	U.S. DEPARTMENT OF ENERGY	ROCKY FLATS OFFICE	GOLDEN, COLORADO	Rocky Flats Plant	GOLDEN, COLORADO	SOLAR POND/CONCRETE STABILIZATION PROJECT	MATERIAL HANDLING STUDY	PAD 750 - INVENTORY STORAGE - PLAN	AT PROJECT COMPLETION	SIZE	DATE	NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100.	
	FACT :	DESIGNED	BY	DATE	DESCRIPTION	DATE	U.S. DEPARTMENT OF ENERGY	ROCKY FLATS OFFICE	GOLDEN, COLORADO	Rocky Flats Plant	GOLDEN, COLORADO	SOLAR POND/CONCRETE STABILIZATION PROJECT	MATERIAL HANDLING STUDY	PAD 750 - INVENTORY STORAGE - PLAN	AT PROJECT COMPLETION	SIZE	DATE	NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100.
	SCALE :	DESIGNED	BY	DATE	DESCRIPTION	DATE	U.S. DEPARTMENT OF ENERGY	ROCKY FLATS OFFICE	GOLDEN, COLORADO	Rocky Flats Plant	GOLDEN, COLORADO	SOLAR POND/CONCRETE STABILIZATION PROJECT	MATERIAL HANDLING STUDY	PAD 750 - INVENTORY STORAGE - PLAN	AT PROJECT COMPLETION	SIZE	DATE	NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100.
	SCALE :	DESIGNED	BY	DATE	DESCRIPTION	DATE	U.S. DEPARTMENT OF ENERGY	ROCKY FLATS OFFICE	GOLDEN, COLORADO	Rocky Flats Plant	GOLDEN, COLORADO	SOLAR POND/CONCRETE STABILIZATION PROJECT	MATERIAL HANDLING STUDY	PAD 750 - INVENTORY STORAGE - PLAN	AT PROJECT COMPLETION	SIZE	DATE	NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100.
	SCALE :	DESIGNED	BY	DATE	DESCRIPTION	DATE	U.S. DEPARTMENT OF ENERGY	ROCKY FLATS OFFICE	GOLDEN, COLORADO	Rocky Flats Plant	GOLDEN, COLORADO	SOLAR POND/CONCRETE STABILIZATION PROJECT	MATERIAL HANDLING STUDY	PAD 750 - INVENTORY STORAGE - PLAN	AT PROJECT COMPLETION	SIZE	DATE	NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100.
	SCALE :	DESIGNED	BY	DATE	DESCRIPTION	DATE	U.S. DEPARTMENT OF ENERGY	ROCKY FLATS OFFICE	GOLDEN, COLORADO	Rocky Flats Plant	GOLDEN, COLORADO	SOLAR POND/CONCRETE STABILIZATION PROJECT	MATERIAL HANDLING STUDY	PAD 750 - INVENTORY STORAGE - PLAN	AT PROJECT COMPLETION	SIZE	DATE	NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100.
	SCALE :	DESIGNED	BY	DATE	DESCRIPTION	DATE	U.S. DEPARTMENT OF ENERGY	ROCKY FLATS OFFICE	GOLDEN, COLORADO	Rocky Flats Plant	GOLDEN, COLORADO	SOLAR POND/CONCRETE STABILIZATION PROJECT	MATERIAL HANDLING STUDY	PAD 750 - INVENTORY STORAGE - PLAN	AT PROJECT COMPLETION	SIZE	DATE	NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100.
	SCALE :	DESIGNED	BY	DATE	DESCRIPTION	DATE	U.S. DEPARTMENT OF ENERGY	ROCKY FLATS OFFICE	GOLDEN, COLORADO	Rocky Flats Plant	GOLDEN, COLORADO	SOLAR POND/CONCRETE STABILIZATION PROJECT	MATERIAL HANDLING STUDY	PAD 750 - INVENTORY STORAGE - PLAN	AT PROJECT COMPLETION	SIZE	DATE	NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100.
	SCALE :	DESIGNED	BY	DATE	DESCRIPTION	DATE	U.S. DEPARTMENT OF ENERGY	ROCKY FLATS OFFICE	GOLDEN, COLORADO	Rocky Flats Plant	GOLDEN, COLORADO	SOLAR POND/CONCRETE STABILIZATION PROJECT	MATERIAL HANDLING STUDY	PAD 750 - INVENTORY STORAGE - PLAN	AT PROJECT COMPLETION	SIZE	DATE	NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100.
	SCALE :	DESIGNED	BY	DATE	DESCRIPTION	DATE	U.S. DEPARTMENT OF ENERGY	ROCKY FLATS OFFICE	GOLDEN, COLORADO	Rocky Flats Plant	GOLDEN, COLORADO	SOLAR POND/CONCRETE STABILIZATION PROJECT	MATERIAL HANDLING STUDY	PAD 750 - INVENTORY STORAGE - PLAN	AT PROJECT COMPLETION	SIZE	DATE	NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100.
	SCALE :	DESIGNED	BY	DATE	DESCRIPTION	DATE	U.S. DEPARTMENT OF ENERGY	ROCKY FLATS OFFICE	GOLDEN, COLORADO	Rocky Flats Plant	GOLDEN, COLORADO	SOLAR POND/CONCRETE STABILIZATION PROJECT	MATERIAL HANDLING STUDY	PAD 750 - INVENTORY STORAGE - PLAN	AT PROJECT COMPLETION	SIZE	DATE	NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100.
	SCALE :	DESIGNED	BY	DATE	DESCRIPTION	DATE	U.S. DEPARTMENT OF ENERGY	ROCKY FLATS OFFICE	GOLDEN, COLORADO	Rocky Flats Plant	GOLDEN, COLORADO	SOLAR POND/CONCRETE STABILIZATION PROJECT	MATERIAL HANDLING STUDY	PAD 750 - INVENTORY STORAGE - PLAN	AT PROJECT COMPLETION	SIZE	DATE	NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100.
	SCALE :	DESIGNED	BY	DATE	DESCRIPTION	DATE	U.S. DEPARTMENT OF ENERGY	ROCKY FLATS OFFICE	GOLDEN, COLORADO	Rocky Flats Plant	GOLDEN, COLORADO	SOLAR POND/CONCRETE STABILIZATION PROJECT	MATERIAL HANDLING STUDY	PAD 750 - INVENTORY STORAGE - PLAN	AT PROJECT COMPLETION	SIZE	DATE	NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100.
	SCALE :	DESIGNED	BY	DATE	DESCRIPTION	DATE	U.S. DEPARTMENT OF ENERGY	ROCKY FLATS OFFICE	GOLDEN, COLORADO	Rocky Flats Plant	GOLDEN, COLORADO	SOLAR POND/CONCRETE STABILIZATION PROJECT	MATERIAL HANDLING STUDY	PAD 750 - INVENTORY STORAGE - PLAN	AT PROJECT COMPLETION	SIZE	DATE	NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	4																																																						



COMPUTER GENERATED  
NO MANUAL CHANGES ALLOWED







**PRELIMINARY**

THIS ARRANGEMENT IS SUBJECT TO CHANGE AS THE PROCESS DESIGN AND LAYOUTS ARE FINALIZED.

750 PAD  
LOW WATER RATIO  
PROCESS CONFIGURATION  
MAXIMUM STACK HEIGHT  
= 5 HALF CRATES

**NOTES:**

1. THE WESTON SOLAR POND SAMPLING REPORT, DATED JULY 1991, IS THE BASIS FOR QUANTITIES OF WASTE INPUT TO THE STABILIZATION PROCESS.
2. MAXIMUM PERMITTED VOLUME OF WASTE 14,000 CUBIC YARDS, WHICH IS EQUIVALENT TO 8073 HALF CRATE CONTAINERS.
3. WASTE INVENTORY SCHEDULE:

SOURCE	QUANTITY OF POND/CONCRETE TO BE GENERATED HALF CRATES	DESIGNATED AREA
POND SLUDGE FROM 207B-N, C, & S	2,495	A
POND SLUDGE FROM 207A	5	B
CLARIFIER TANK BOTTOMS	151	C
POND SLUDGE & LIQUID FROM 207C	1,669	D1 + D2
EVAPORATOR BOTTOMS	908	E
<b>TOTAL STABILIZED WASTE</b>	<b>5,228</b>	<b>9,065</b>
4. TRASH  
1 FULL CRATE 4
5. ALL STACKS LOCATED OUTSIDE OF SHELTERS ARE 5 HALF CRATES TALL AND UNDER TARPULINS.
6. ALL STACKS MUST HAVE LATERAL RESTRAINT TO COMPLY WITH SEISMIC CODE REQUIREMENTS.
7. AISLES BETWEEN THE ENDS OF STACKS ARE 5 FEET WIDE.

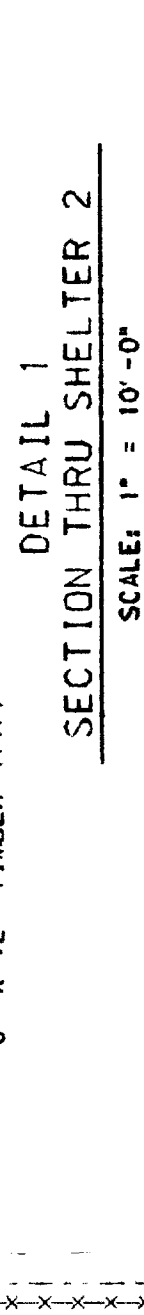
**Brown & Root Inc.**



ENGINEERS • CONSTRUCTORS

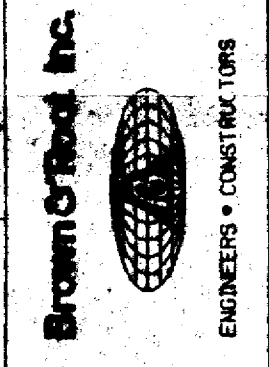
KEYWORDS		DATE		DESCRIPTION		BY		DATE		U.S. DEPARTMENT OF ENERGY		ROCKY PLATE OFFICE		SALMON COLUMBIA		Rocky Plate Plant		GOLDEN, COLORADO		SOLAR POND/CONCRETE STABILIZATION PROJECT		MATERIAL HANDLING STUDY		PAD 750		INVENTORY STORAGE - PLAN		AT PROJECT COMPLETION		SHEET		12 of 3			
1. TOLERANCE		2. DATE		3. TOWN		4. CHECKED		5. APPROVED		6. SCALE		7. SCALE		8. SCALE		9. SCALE		10. SCALE		11. SCALE		12. SCALE		13. SCALE		14. SCALE		15. SCALE		16. SCALE		17. SCALE		18. SCALE	
19. SCALE		20. SCALE		21. SCALE		22. SCALE		23. SCALE		24. SCALE		25. SCALE		26. SCALE		27. SCALE		28. SCALE		29. SCALE		30. SCALE		31. SCALE		32. SCALE		33. SCALE		34. SCALE		35. SCALE			

COMPUTER GENERATED  
NO MANUAL CHANGES ALLOWED



THIS ARRANGEMENT IS SUBJECT TO  
CHANGE AS THE PROCESS DESIGN  
AND LAYOUTS ARE FINALIZED.

750 PAD  
LOW WATER RATIO  
PROCESS CONFIGURATION  
MAXIMUM STACK HEIGHT  
= 4 HALF CRATES

[illegible]

COMPUTER GENERATED  
NO MANUAL CHANGES ALLOWED

### 3. WASTE INVENTORY SCHEDULE:

SOURCE	QUANTITY OF PONDCRETE TO BE GENERATED		DESIGNATED AREA
	HALF CRATES	CU. YD.	
POND SLUDGE FROM 207B-N, C, & S	2,495	4,327	A
POND SLUDGE FROM 207A	5	8	B
CLARIFIER TANK BOTTOMS	151	262	C
POND SLUDGE & LIQUID FROM 207C	1,669	2,894	D1 + D2
EVAPORATOR BOTTOMS	908	1,574	E
TOTAL STABILIZED WASTE	5,228	9,065	

4. TRASH 1 FULL CRATE 4
5. ALL STACKS LOCATED OUTSIDE OF SHELTERS 2 AND 3 ARE 4 HALF CRATES TALL AND UNDER TARPAPULINS. HALF CRATES STORED IN SHELTERS DO NOT REQUIRE TARPAPULINS AND ARE ARRANGED AS ILLUSTRATED ABOVE AS DETAIL 1 & 2.
6. ALL STACKS MUST HAVE LATERAL RESTRAINT TO COMPLY WITH SEISMIC CODE REQUIREMENTS.
7. AISLES BETWEEN THE ENDS OF STACKS ARE 8 FEET WIDE.

7. AISLES BETWEEN THE ENDS OF STACKS ARE 5 FEET WIDE.





**PRELIMINARY**


904 PAD

COMIX WITH TRASH REMOVAL  
PROCESS CONFIGURATION

THIS ARRANGEMENT IS SUBJECT TO  
CHANGE AS THE PROCESS DESIGN  
AND LAYOUTS ARE FINALIZED.

[illegible]

**Brown & Root Inc.**



**ENGINEERS • CONSTRUCTORS**



